EFFECTIVENESS OF CARDIAC REHABILITATION PROGRAMME ON ACTIVITY TOLERANCE, SELECTED PHYSIOLOGICAL PARAMETERS HEART RATE(HR), ELECTROCARDIOGRAM (ECG))AND QUALITY OF LIFE AMONG HOSPITALIZED CABG SURGERY PATIENTS

A Thesis

Submitted to The Tamil Nadu Dr. M.G.R. Medical University, Chennai,

for the award of the Degree of

DOCTOR OF PHILOSOPHY IN NURSING

By

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2015

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CERTIFICATE BY GUIDE

This is to certify that the thesis entitled **"Effectiveness Of Cardiac Rehabilitation Programme On Activity Tolerance, Selected Physiological Parameters Heart Rate(HR), ElectroCardioGram (ECG))And Quality Of Life Among Hospitalized CABG Surgery Patients"** submitted by **P.ANDAL, M.Sc. (N),** who registered for Ph.D in 2010 is a bonafide record of the research done by her under my supervision and guidance and that it is not formed on any basis for the award of any other Degree, or Diploma, Associateship, Fellowship (or) any other similar title in this University (or) any other Universities (or) Institution of higher learning.

I also certify that this thesis is her original independent work. I recommend this thesis should be placed before the examiners for the award of Ph.D degree.

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CERTIFICATE BY CO-GUIDE

This is to certify that the, work embodied in the thesis entitled **"Effectiveness Of Cardiac Rehabilitation Programme On Activity Tolerance, Selected Physiological Parameters Heart Rate(HR), ElectroCardioGram (ECG) And Quality Of Life Among Hospitalized CABG Surgery Patients"** submitted by **P.ANDAL, M.Sc. (N),** for the award of the degree of Doctor of Philosophy in Nursing is a bonafide record of research done by her under my supervision and guidance and that it is not formed on any basis for the award of any other degree, or Diploma, Associateship, Fellowship or any other similar title in this university (or) any other university or institution of higher learning.

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DECLARATION

I hereby declare that this thesis entitled **"Effectiveness Of Cardiac Rehabilitation Programme On Activity Tolerance, Selected Physiological Parameters Heart Rate(HR), ElectroCardioGram (ECG))And Quality Of Life Among Hospitalized CABG Surgery Patients"**, is an original work done by me under the guidance of **Dr.C.NALINI JEYAVANTHA SANTHA, M.Sc (N), Ph.D.,** Principal, Sacred Heart Nursing College, Madurai and has not been submitted elsewhere, either partially or fully for the award of any other degree, or diploma, Associateship, Fellowship or any other similar title.

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ACKNOWLEDGEMENT

“Responsibilities are always to be fulfilled”

First of all I praise and thank God for his abundant blesssings which strengthened me in each and every step through out this en deavour.

I extend my sincere thanks to **Prof.KR.Arumugam,** M.Pharm, Correspondent, Sacred Heart Nursing College, Ultra Trust, Madurai for permitting me to conduct this study in this esteemed institution.

I express my deep sense of gratitude and heartful thanks to my research guide cum teacher **Dr.C.Nalini Jeyavantha Santha** Ph.D(N),Principal, Sacred Heart Nursing College, Madurai for her expert guidance, constant encouragement, untiring effort ,enthusiasm, patience, elegant direction at every stage in shaping the study, encouragement, time she spared ,extra ordinary skill and and personal interest which inspired me to overcome hurdles on the way in moulding my study in better way and to complete my study successfully.

I Owe my thanks to **Dr.Jeya singh** MD., DV Ph.D Co guide for his timely support, valuable suggestions and encouragement which helped me to bring out the project in successful way.

My faithful thanks to **Dr.S.Chandrakala** M.Sc.,(N) Ph.D Vice Principal , Sacred Heart Nursing College, Madurai, for her support, valuable guidance and encouragement for the completion of this study.

It is my previlage to express thanks to all the ethical committee members of Sacred Heart Nursing College and Government Rajaji Hospital Madurai ,for

permitting to undertake the study. My deep sense of gratitude to **Dr.Balanayagam** MS,M.Ch.,HOD, Cardiothoracic Department, **Dr.Ragunathan** MS, M.Ch HOD Cardiothoracic Department who gave permission to conduct this study in cardio thoracic Department. I am extremely greatful to them for their support to pursue the study.

I Owe my special thanks to **Dr.H.Juliet Sylvia,** M.Sc.,(N)Ph.D., Professor Sacred Heart Nursing College **Prof.E.Devakirubai,** M.Sc.,(N) Ph.D., Professor Sacred Heart Nursing College for their valuable suggestions, opinions rendered throughout the study .

My affectionate thanks to my Colleagues **Mrs.S.Manjula,** M.Sc.,(N) Ph.D., Professor Sacred Heart Nursing College. **Mrs.B.Thanga Pappa,** M.Sc.,(N) Asso. Professor Sacred Heart Nursing College. **Prof.S.Reeta Solomon** M.Sc.,(N) Ph.D., Professor Sacred Heart Nursing College **Prof.E.Deva Kirubai** M.Sc.,(N) Ph.D., Professor Sacred Heart Nursing College, **Dr.H.Juliet Sylvia,** M.Sc.,(N) Ph.D., Professor Sacred Heart Nursing College for their inspiring guidance, prayers, and encouragement who helped me throughout my project.

My special thanks to **Mrs.P.Shanthi,** M.Sc.,(N) Ph.D., Professor CSI JACON, **Mrs.R.Jancy,** M.Sc.,(N) Ph.D., Professor CSI JACON for their encouragement and timely help .

I express my Thanks to **Dr.Vijaya Rajan** M,A, Ph.D..,F.I.S.C., and **Dr. G. Jeya Kumar** MA, M.Ed Ph.D., who helped me with editorial skills.

I extend my sincere thanks to **Dr.B.Anantha Valli** Valliammal institute who helped me in Tamil translation of intervention and tool.

I accord my sincere Thanks to **Mr. Jeyaram, Mr.Prem Kumar, Dr.Felix** for their excellent expert guidance in statistical analysis and interpreting in the meaningful way.

I Would extend my sincere Thanks to **Mr.Prakash,** B.Sc Nilaa Net Café and all staffs of **Laser Point, Vasantha Nagar, Madurai** for their innovative work to bring study in printed form.

I express my sincere thanks to all the **participants** who agreed to participate in this research work and had shown interest in sharing their opinions and providing the needed information to complete this research successfully. My heartful thanks to all **CABG Surgery patients** enthusiastically participated in my study.

I owe my special thanks to my mother in law **Mrs. Ramalakshimi** for her special blessings, cooperation and prayers. I thank my sister in laws and all my family members for their timely help and support throughout the study especially Ishwarya and Nivetha who helped me in computer works.

I feel incredibly greatful to my mother **Mrs. Seethalakshmi** and my sisters and brother for their comfort and encouragement.

I express my heartful thanks to my Husband **Mr.Venkatesh kumar** who consoled me in my ups and down, to give best efforts, for endless contribution in each and every step through out the thesis. At last I wish to dedicate my Dissertation to my daughter and son **S.V.Hareeni** and **S.V. Gautham**. I am deeply indebted to my lovable children who sacrificed lot of time during this study period.

ABSTRACT

The present study assess the effectiveness of cardiac rehabilitation programme on activity tolerance, selected physiological parameters(heart rate,ECG) and quality of life among CABG patients admitted in selected hospital, Madurai.

Introduction

Cardiovascular disease is the leading cause of global death accounting for 17.3 million deaths per year,a number is expected to grow more than 23.6 million by 2030.one of the disease that affect the blood vessels of the heart is coronary artery disease. There are several medical management available .If there multiple blocks are in the vessels surgical treatment is needed. one of the advanced surgical procedure is coronary artery by pass graft. After surgery cardiac rehabilitation programme helps the person to attain maximum physical and psychosocial health.

Ai m

The aim of the study those who received cardiac rehabilitation programme will experience more activity tolerance and improved physiological parameters (heart rate, ECG) and quality of life

Objectives

- To find out the pretest and posttest activity tolerance, selected physiological parameters (heart rate, ECG) and quality of life of patients with CABG surgery in experimental and control group.

- To find out the effectiveness of cardiac rehabilitation programme in terms of activity tolerance, selected physiological parameters (heart rate, ECG) and quality of life of patients with CABG surgery.
- To findout the relationship between activity tolerance of the patients with CABG surgery who received cardiac rehabilitation programme and their quality of life.
- To find out the telationship between physiological parameters (heart rate, ECG) of the patients with CABG surgery who received cardiac rehabilitation programme and their quality of life.

Methodology

A quantitative approach with quasi experimental non equivalent pre test post test control group design is used for the study.100 CABG patients who had undergone CABG surgery in cardiothoracic postoperative ward Government Rajaji Hospital Madurai aged between 35-75 were taken. Among them 50 were assigned for intervention group and 50 were assigned for control group. Intervention group received cardiac rehabilitation three consecutive days through planned teaching programme and demonstration .They were given instruction to follow and it was insisted by telephonic conversation changes in activity tolerance ,physiological parameters (heart rate ECG , ECHO) and QOL were assessed before 30 days and 60 days in both the groups . The standardised tool were used and the content validated by experts and tools were checked for reliability by cronbach alpha method

Duke activity status index for activity tolerance .865 and SF - 36 questionnaire quality of life for.865 for heart rate .9 by inter rator method ECG-.75 and ECHO-.75 were obtained before applied to collect data from the samples.

Results

The results found that the CABG patients received cardiac rehabilitation programme had increased activity tolerance scores in post test I and II 18.52&22.3 which is statistically significant at .001 level. In physiological parameters ECG ST Depression scores which was reduced to 1.300 which is significant to .001 level and in ECHO EF Scores it was improved to 51.62 . There was no significant change in heart rate scores.In QOL all parameters were improved in post test I and II PF-63,79 RL Physical 48.56.6 RL Emotional 48,46,61 Vitality 55.76,71.74 EW- 56.68,72.96, SF-60.56,75.7, Pain 56.5,70.54 General health 65.24,72.40.The repeated measure anova results proved that intervention is effective in improving activity tolerance, physical functioning, Role limitation physical, Vitality, Emotional wellbeing, social functioning and general health scores except Role limitation physical and pain recovery. The present study findings concluded cardiac rehabilitation had positive effects on activity tolerance, physiological parameters (ECG, ECHO) and Quality of life.

Recommentations

Cardiac rehabilitation can be used in clinical and community settings to improve activity tolerance, physiological parameters (HR,ECG,ECHO) and quality of life.

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ABBREVATIONS

S.NO	ABBREVATIONS	EXPANSIONS
1	CAD	Coronary Artery Disease
2	CHD	Coronary Heart Disease
3	IHD	Ischemic Heart Disease
4	CVD-	Cardio Vascular Disease
5	DALY	Disability Adjusted Life Years
6	DM	Diabetes Mellitus
7	AGACRF	Actual and Global Assessment of Cardiac Risk forms
8	MI-	Myocardial Infarction
9	DASI	Duke Activity Status Index
10	ECG	Electrocardiogram
11	CKMB	Creatinine kinase muscle bromide
12	MET	Metabolic equivalent test
13	AHACVPR	American Heart Association Cardio Vascular Pulmonary Rehabilitation
14	ACE Inhibitors	Acetyl Choline Esterase Inhibitors
15	PCI-	Percutaneous coronary intervention
16	CABG-	Coronary Artery Bypass Graft
17	LITA	Left Internal Thoracic Artery
18	RITA	Right Internal Thoracic Artery
19	EVH	Endoscopic vessel harvesting

20	IETT	Incremental exercise tolerance testing
21	LDL-	Low density lipo protein
22	HDL	High density lipo protein
23	TG	Triglycerides
24	PMI	Post myocardial infarction
25	TWC	Total work capacity
26	HRQL	Health related quality of life
27	RPE	Rapid perceived exertion
28	LVEF	Left ventricular ejection fraction
29	SF 12	Short form health survey 12
30	6MWT	6Minute walk test
31	PCS-	Physical component scale
32	MCS	Mental component scale
33	QOL	Quality of life scale
34	SBP	Systolic blood pressure
35	HRV-	Heart rate variability
36	Peak vo2	Cardio respiratory function
37	CRP	Cardiac rehabilitation programme
38	UK	United kingdom
39	B6&B12	Vitamin B6&B12
40	PMRT	Progressive muscle relaxation technique
41	DREAM	Diet, Relaxation, Exercise, Attitude and Motivation

42	BMI	Body mass index
43	WHR-	Waist to hip ratio
44	NFHS-	National family health surveys
45	USPHS	United states family health surveys
46	CVRFs-	Conventional cardio vascular risk factors
47	NYHA	New york heart association
48	HR	Heart rate
49	SBP	Systolic blood pressure
50	DBP	Diastolic blood pressure
51	EF	Ejection fraction

CHAPTER – I

"Each heart deserves to be the best. cardiac rehabilitation take your recovery to heart"[1]

BACKGROUND OF THE STUDY

Cardiovascular Disease (CVD) is the commonest reason for mortality rate on earth, and the major mortality happening in low and middle- socio economic countries like India and China[2]. Board for Global Health in Developing World 2010 has stated cardiovascular diseases are epidemic in nature in town regions of these nations and it is quickly growing in rural areas also[3]. Health policy of India has said that there is a limited planning for chronic disease control. As such cardio vascular diseases are bound to increase additionally [4]

.

The arteries of the heart normally give blood and oxygen to the heart . When it is narrowed or fully obstructed, it causes Coronary Artery Disease (CAD). It is also known as arteriosclerotic heart disease, coronary atherosclerosis, coronary arteriosclerosis, coronary heart disease and ischemic heart disease. Pathologically, coronary heart disease is characterised by excessive deposit of fat or lipid substances and tissue in the vessel wall that adds changes in the arterial wall structure and physiology and decreases in the flow of the blood to the myocardium .Atherosclerotic disease is probably caused by the alteration in the lipid metabolism, blood coagulation and the biochemical and biophysical properties of the arterial wall .Acute heart attacks are largely caused by blockage that prevents blood to the heart. The inside walls of the vessels supplying blood to the heart getting accumulated with fatty deposits is the most common cause of this disease.Acute coronary syndrome is a term used to explain potential complications

of coronary artery disease. Silent ischemia ,chronic stable angina, acute coronary syndrome, unstable angina, ST segment elevation myocardial infarction and non ST segment elevation Myocardial infarction are included with in the cardiac disease [5].

According to American Heart Association2015,Heart disease and stroke statistic update data cardio vascular disease is the major reason for global mortality, contributing to 17.3 million, deaths per year, the number is predicted to increase further to 23.6 million by 2030.[6]

WHO's prediction is that for 20 years up to 2020 India will experience premature deaths because of CHD. It has also said that this will double in both men and women from 7.7 &5.5 millions respectively[7].

Risk factors

The INTERHEART (2008) study houses the largest case control studies. Twenty seven thousand acute myocardial infarction were included. In order to assess various cardiovascular behavioural and biological factors of risk in all people ina population of 27000 population, 2000 subjects were studied from South Asian regions[8]. Smoking, Excessive fat, High blood pressure, High blood sugar, truncal obesity, Physical inactivity, emotional stress, and reduced intake of fruit and vegetables are consideredto be the major risk factors. Majority of cardio vascular risk factorsthat is (90 %) are found among South Asians. Same conclusionsare obtained in small group of studies also[9].

Table:1.1

Percentage of risk factors of Myocardial infarction according to INTERHE ARTSTUDY(2008)

Risk factor	**Inter Heart risk factor for acute myocardial infarction**
Apo lipo protein	49.2
Hypertension	17.9
Smoking history	35.7
History of Diabetes	09.9
High waist hip ratio	20.1
Lack of Regular physical activity	12.2
Improper diet	13.7
Alcohol intake	06.7
Psycho social stress	32.5
cardiac causes	----

Many epidemiological studies show that cardiovascular risk factors are high in India . This is due tosignificant rise in tobacco usage and smoking among the youth in the age group of twenty to thirty five years. Second and Third National Family Health Surveys (NFHS) Report in town population, smoking is widespread in less educated people[10]. Hypertension is high among people in both urban and rural areas. Presently it is found that urban and rural adults (25%-40%) and(10%-15%) respectivelyare affected with hypertension[11]. one of the North Indian

studies[12]documentedhighaverage levels of low density lipoprotein and triglycerides, and decreasing good cholesterol level between subjects .

Despite there were regional changes in the presence of diabetes it was four times increased in the last two decades that was from < 1%-3% to 10%-15% in urban areas as well as 3%-5% in rural areas[13]. Increasing obesity,particularly abdominal obesity caused by inactive life practices, and stress, was reported by studies[14].

A retrospective study was done by Aggarwal etal (2012)[15] to identify changeable risk factors and lipid profile in adult CAD subjects . A total of 292 patients were studied between 2005-2009 in Delhi. Results showed that most common factors were dyslipidaemia (91%), smoking (74.3%), reduced good cholesterol (HDL-C) (68.9%), central obesity (47.7%) and greying of hair (34.9%) . In their opinion , women had higher occurrence of dyslipidaemia, low HDL-C, abdominal obesity, high blood pressure, high blood sugar and family history of premature CAD

.

Medical Management of CAD includes Antianginals: nitroglycerin, isosorbide dinitrate and mononitrates. Beta-blocker or calcium channel blockers were used in addition to antianginals. Clopidogrel and aspirin as antithrombotic prophylaxis, some Statin prophylaxis and healthy lifestyle practices also essential along with medical management.[16]

Surgical treatment of CAD includes, Percutaneous Coronary Intervention, with or without stenting (PCI), and Coronary Artery Bypass Grafting (CABG).

CABG reduces long-term cardiac morbidity in terms of symptom recurrence. Both are termed as Reperfusion procedures[17].

CABG surgery is mainly done to retain cardiac blood supply. However, surgery will not interfere development of fatty deposits, and fatty material into artery walls, narrowing the blood vessels and ultimately reducing blood flow once again. Professionals need to treat the underlying causative factors which lead to progression of the fatty deposit , so that , the recurrence of the disease can be reduced. **CABG** is not only a surgical intervention but it also involves physical, psychological, emotional and social adjustment[18].

United State Public Health Service (USPHS)has defined that, Cardiac Rehabilitation (CR) is a process including medical examination, supervised physical activity, teaching and counselling of subjects with heart disease[19].Thus, cardiac rehabilitation has been viewed as an important criteria of care for subjects with coronary artery disease and it which is useful and safe program[20].

Numerous studies have shown the importance of cardiac rehabilitation and exercise therapy and their impacts on reducing further cardiac problems include hypertension, arrhythmia, depression and obesity . Studies have proved that cardiac rehabilitation has reduce cardiac morbidity and mortality by 40% in cardiac patients. [21-23]

Regular physical activity is a basic activity of cardiac Rehabilitation Program (CRP). It will improve functional activity after coronary artery bypass surgery in cardiac subjects. Regular physical activity has improved cardiovascular and peripheral adaptations. It has improved blood flow and skeletal muscle oxygen usage. Further, it enhances metabolism of the body .It helps to correct

cellular damage in the skeletal muscle and blood vessel. Also, normal exercise helps in preventing further progression of coronary artery disease .It decreases disease related symptoms in subjects with known cardiovascular disease [24].

Patients with CAD cardiac rehabilitation are often ignored by nurses. Immediate care after surgery, like use of incentive spirometry, coughing technique, abdominal breathing and wound care help to prevent immediate complications. The nurse has to explain about the CABG surgery and provide appropriate information. Further, lifestyle modification education includes preparatory information about when to return to work, sex, activity advancement, dietary management, follow up strategies and ,stress management techniques must be given to patients. Exercise Therapy aims at planned, structured and repetitious movement of physical activity with the intention of improving some of the physical parameters which increase cardiac fitness. Nurses play an essential part in cardiac rehabilitation by giving appropriate education about their disease condition and proper life style modification. A patient needs close observation in phase II during the first two months after discharge. The rehabilitation nurse must pay attention on quality of life. The cardiac rehab program provides psychosocial and physical needs of CHD patients.

Nurses play a pivotal role in rehabilitation of patients who undergo CABG. It is necessary for the nurse to know the existing habits of life of patients in order to plan interventions to increase the quality of life of the patients. Research and clinical practice in areas like Quality of life assessment**,** developing intervention for CABG patients, management of complications, individualized care, sexual counselling, hope program and support group and family care are needed for CABG patients . Nurse

can significantly impact the patient's quality of life by providing health education and motivation , determining the social, psychological, spiritual needs, promotion of exercise and progressive activity[25].

Need for the study

According to Brunner and Suddarths, Coronary Heart Disease is also known as ischemic heart disease ".It occurs due to obstruction in the blood vessel that supplies blood to various muscles of the Heart .There are Two major forms of CHD. Heart attack which is an acute life threatening danger in which the blood vessel is completely blocked and it requires urgent treatment. Angina is a long lasting condition which indicates temporary deficiency in the blood supply[4].

Common forms of coronary thrombosis are described in forms of Myocardial infarction, sudden death and unstable angina . This progresses because of breakdown of, dangerous or gradually wore fatty deposit plaque. Chronic fatty deposit lesions will not have break down and ruptured plaques, often will not stimulate thrombosis. As such coronary disease will not show any symptom associated with decreased death rate. A situation where plaques begin to break and thrombogenic substance is contacted with blood circulation, a condition comes to existence and causes to acute coronary syndrome[26].

Global and regional burden of disease and lancet 2000 stated that Coronary artery disorder is the major reason for mortality in adult people of all countries which accounts for about 80% of CVD deaths and high income countries also have similar experience.[27]

The main reason for mortality around the world in 2030 is expected to be from the following: Ischemic Heart Disease (IHD) and cerebrovascular disease (stroke). These are components of CVD. CVD epidemic is building up in developing nations, the greater disease burden would change to the bottommost socioeconomic people[28]. Heart disease is also the commonest reason for death in females across the world.[29]

By the end of last century, a report was made about CAD mortality being increased to about 29% in female and 48% in male in industrialised nations in 1990-2020. The respective mortality estimates in developing nations were 120% in female and 137% in male[30].

According to the US Heart Disease Statistics update 17.6 million reported coronary artery disease. In that, 8.5 million people had MI and 10.2 million people had Angina pectoris[31]. Guyana in South America which has the largest CVD mortality rate. It was reported high in Surinam, Brazil, and Paraguay also [32].The old age people of Brazil are predicted to markedly rise the burden of CVD in the upcoming decades[33]

According to British Heart Foundation 2012 statistics, in 2011 around 292 million people in England suffered from Cardiovascular Disease. It was reported Over 87,000 PCI surgeries were done in each year in the UK more than 3 times than ten years ago . "The number of inpatient episodes for CHD was 45,000 in England, 50,200 in Scotland, 24,300 in Wales and 14,600 in Northern Ireland in 2012[34].

Cardiovascular disease continually results in higher death rate burden in Europeans compared to other diseases. According to the Last year CVD data 51% and 42% women and men were reported, respectively. Country wise, the changes

were large in number. There were 10 European nations where cancer was the largest reason for death rates in female and CVD was common cause of mortality in men. (Belgium, Denmark, France, Israel, Luxembourg, Netherlands, Portugal, Slovenia, Spain, and San Marino). The recent report (2013) focuses that, for the first time in Denmark, the death due to cancer in females is higher than CVD, On the contrary, recent data show more than twice mortality due to CVD. It was compared with cancer in females and it reported that in fifteen nations, CVD reported 4 times increased deaths than cancer. In case of male, there were 21 countries where CVD deaths were more than twice the cancer death rates. In six countries, CVD was reported more than four times the cancer death rates .

According to CHD statistics 2012 edition of the university oxford, CHD has affected 5, 85,900 Australians in 2011 & 2012[35]. In sub-Saharan Africa, high blood pressure is still the major factor of risk with a nationwide occurrence mean of 15-30% in case of aduts[36]. Although smoking rates in African male are high, the occurrence of other factors of risk is low when compared with other regions.[37]. The CVD in sub-Saharan Africa was raised in 1990 and 2000[38]. CVD burden which was estimated will be doubled in sub-Saharan Africa between 1990 and 2020[39].

Cardiovascular disease mortality rate which will be expected to increase in 2020 in China and in other countries of Asia(77% and 106%) respectively and which was estimated only with 15% for high income nations[40].People in the northern and north western areas of China are found to intake more sodium than the people of southern areas. The occurrences of high blood pressure, increased average serum cholesterol, and high BMIare more in the north than the south and in cities

compared with villages. The Occurrences of overweight and obesity in China have raised to about 39% and 82%, respectively, in the last 10 years[41].

According to World Heart Day 2014, in India the reasons for increase of heart failure are CHD, high blood pressure, overweight, high blood sugar and rheumatic heart disease. It is about 1.3 to 4.6 million with occurrence annually at a rate among 491600 to 1.8 million[42].

In Japan, high blood pressure is the most prominent CVD factor of risk. The food habits have only low fat content, but the adaptation to the western style of food, has lead to an increased blood sugar level, overweight and hyper cholesteraemia. Smoking rates among men are elevated.

It is confirmed that around 2.4 millions of Indians will die because of heart disease every year . India is set to be the heart disease capital of the world . It is predicted that by 2020 CVD will be the cause for over 40% mortality in India . The prevalence of CAD in rural India is evaluated to be up to 7% as compared to urban areas up to 12%[43].

International Public Health Journal estimated 21.4 per cent high blood pressure occurrence in about 10,500 people (aged 25-64) in 11 villages in Tamil nadu. Occurrence of the disease was almost similar in both sexes . Hypertension was said to be the main factor of risk for heart diseases next to cerebro vascular accident and renal failure. Mortality rate in people ranging between 45-59 years (24.5%)in rural Tamil Nadu was said to be caused by circulatory disorders [44].

According to Harsh Mahajan (2012), India is set to experience a sudden large increase in deaths because of cardiac disease. In 2020, India would suffer

from 4.77 million deaths a year because of heart disease . China, the largest populated country is expected to have a mortality of 1.34 billion, and 4.53 Million, respectively due to cardiovascular disease and coronary heart disease by 2020[45].

Table : 1.2

Risk Factors[46]

Non – modifiable Risk Factors	Modifiable Risk Factors
Gender: Higher in men than premenopausal women **Age:** Male > 45 years Female > 55 years **Family History:** CHD in close relatives and/or premature CHD	Active and passive smoking Physical inactivity Obesity Diabetes mellitus Hypertension Kidney disease Alcohol consumption Stress **Unhealthy diet:** Increased intake of saturated fats.

WHO's The *World Health Statistics 2012* Report, stated that ' every six person were overweight adults, every10 persons were diabetics and every three persons were with high blood pressure and CHD. Dr Margaret Chan, Director-General of WHO reported about additional evidences which influence cardiac disease and other long term disease conditions, especially in poor and middle socio economic countries. In some African countries, almost half of the adult population has hypertension.

Extensive and intensive diagnosis followed by available treatment with affordable medical management had markedly decreased mean blood pressure between subjects which also influenced decrease mortality from cardiac disease. In Africa, even though, lower rate of acute facilities, more than (40%-50%) of adults in few countries were reported to have hypertension[47].

According to the National Health and Nutrition Examination Survey data of 2009, prevalence of MI individuals aged between 35-54 year during 199 -2004[48] was found to be higher in men than women . Large populations of Asian countries make the situations critical in this regard. In India, CAD occurrence is not by traditional risk factors[49].In china, there is a sharprise in CAD deaths in recent years. Beijingis said to have high lipid levels. The average cholesterol level was 4.30 m mol/L (166 mg/dl) in 1984 and 5.33 m mol/L (206 mg/dl) only 15 years later[50]. Vascular disease rates in Latin America are not favourable, because of physical inactivity, overweight, and smoking[46]. International leaders have planned some strategies to prevent the atherosclerosis in developing nations[51].

Acceptable Cardiovascular Risk Factors (ACVRFs) lead to acute and chronic effect followed by Coronary Artery Bypass Graft surgery (CABG).This sample study showed that one thousand patients underwent elective CABG . Major A CVRFs data were obtained in them. It was compared to elderly subjects and found dyslipidemia, family history of earlier CAD and smoking were common in subjects below 45 years of age. On the contrary, diabetes and hypertension were more common in the elderly people: The research focuses more occurrence of the traditional CVRF, especially high blood sugar, high blood pressure, dyslipedemia which are more common factors in Indian patients undergoing CABG[52].

Medical Management of CAD includes Antiplatelet agents (asprin),Beta adrenergic blockers (metaprolol), Nitrates(sublingual nitroglycerin), Glycoprotein inhibitors (tirofiban), Low molecular weight heparin (fragmin), Adenosine di phosphate inhibitors- (ADP) example clopidogrel Calcium channel blockers (diltiazem), and ACE inhibitors (captopril) .

A common intervention is an elective Percutaneous Coronary Intervention (PCI). The advantage of PCI is that it provides an alternative to surgical intervention. Today, PCI is more frequently performed than CABG. Atherectomy is another technique used to treat CAD. Laser angioplasty is performed with laser energy to dissolve blockage in the coronary artery. Myocardial revascularization (CABG) is the primary surgical treatment for CAD patient who has advanced disease[4].

WHO (2010)[53] estimated that more than 800,000 CABG surgeries were done through out the world annually." CABG was the popular type of open heart surgeries performed in America. Yearly, more than 500,000 surgeries were performed . From multicentre study[54] from several medical centres in New york registry mortality rate is tabulated for each procedure annually as follows

Table : 1.3

DATA OF THE NATIONAL MEDICARE EXPERIENCE FROM NEWYORK REGISTRY BY WHO REPORT

	Death Rate after Angioplasty 2,25,915 subjects		Death Rate After Bypass Surgery 357,885 subjects	
Age	**With in1 month Days**	**Within in 12 months**	**Within in 30 Day**	**Within 1 Year**
	%	%	%	%
65-69	2.1	5.2	4.3	8.0
70-74	3.0	7.3	5.7	10.9
75-79	4.6	10.9	7.4	14.2
>80	7.8	17.3	10.6	19.5

These two surgeries, coronary artery bypass surgery and angioplasty received with frequent angina in patients with coronary artery disease. But in bypass surgery, 10-20% did not attain good recovery while 40-50% of subjects who underwent angioplasty complained about signs of illness appearing again.

The most common problems experienced by patients are infection, poor heart muscle function ,bleeding, risk of lung complications, and swelling of ankle. Mortality is higher in women with advancing age.

Lindsay etal[55] stated that Most of the populations with the understanding of the surgery had a better challenge than they had expected, they experience severe pain and they become less energetic. Beginning pre CABG training and

rehabilitation would also help life style modification and assist individual cope with better abilities after CABG . It helps further more to develop their Quality Of Life.

A study was done to assess the effect of sleep, psychological signs of illness and Quality of Life (Q_OL) in subjects who underwent Coronary Artery Bypass Grafting (CABG) at the University Hospital in Linköping. In the immediate period following CABG it was identified that there was changed pattern of sleep, decrease of night time sleep and an raised daytime sleep, which had come back to preoperative status month after surgery. QOL was improved only after 6months compared to previous surgery. It was identified that the subjects hadmore anxiety prone behaviours within 180 days. After CABG, they drastically had disturbances in sleep, tiredness and reduced functional physical capability, and lower quality of life, compared to previous state. A greater amount of cognitive/behavioural fatigue and emotional behaviour were attributed according to New York Heart Association Scale . The study which investigated patients after CABG showed less quantity and quality of sleep[56].

The objective of Cardiac rehabilitation is to bring back the problems faced by the subjects who have undergone the pathophysiologic and psychological results of cardiac events. It includes medical examination, organised physical activity training, teaching, and counselling of subjects with heart disease.

Cardiac rehabilitation comprises of short term and progressive aims that can beattained by organised physical activity training and counselling .The short term goals include the restoration of physical, mental and social state while the long term goals include the improvement of hearty healthy behaviours that help the person to come back to beneficial day to day activities.

Cardiac rehabilitation educational process has given a lot of positive outcomes to subjects. The major thing of these are enhanced physical activity tolerance, control of signs of illness, improvement in the cholesterol levels, impact on body weight and blood pressure .It helps to reduce stress and improves psychosocial well being. It improves social functioning. Research analyses shows a positive outcome for subjects who take part in cardiac rehabilitation physical activity training .This survival benefit is due to multi factoral intervention [4].

A meta analyses done by Irish nurses on cardiac rehabilitation revealed that, 29 patients who had chest pain, 14 (48%) were assessed and managed by the nurses without medical management. Five patients (17%) were assessed, treated medically and needed admissions for more assessment and diagnostic procedures, such as angiogram. Three of them (10%) were admitted and treated with cardioversion'[57-58]

A study was conducted by Masoumeh Sedeghi etal[59] in Isfahan Cardiovascular Rehabilitation Research Centre to prove the effect of CRP on patients after Coronary Artery Bypass Surgery (CABG) and to assess the effectiveness of cardiac rehabilitation programme on functional capacity and some hemodynamic parameters like lower and upper limit of blood pressure, heart rate, ejection fraction and rate pressure. There were32 subjects preoperatively admitted within two months. They were chosen and assigned in two groups. The intervention group received and completed a CRP for two months after CABG. The intervention group had walking for 15–30 minutes two or three times a week. However, they were not monitored exercise training during this 2-month period. In the above mentioned study, regular medical management consisting of aspirin, beta-blockers and statins,

were equally given to all patients. The medical treatment was routinely given to all patients during study period. Moreover, all subjects had favourable environment for joining in the study, that is. they were able to do walking independently without device , without chest pain, ,dyspnoea angina or musculoskeletal difficulty. Initial assessment before rehab programme for Left Ventricular Ejection Fraction (LVEF) was assessed by two dimensional and M-mode echocardiography was done by a cardiologist.

Along with this, Naughnoton protocol was tested during exercise therapy. Exercise therapyhelped to investigate body changes by estimating heart rate, blood pressure and monitoring electrocardiogram. It also estimated functional capacity by marking the hemodynamic change responses. Thereafter, risk category of subjects (low, intermediate, and high risk) was examined by the cardiac expert with a base of exercise investigation and LVEF.

Further test done to identify the functional capacity of these subjects included6-minute walking (6-MWT) test. On the initial day of Rehabilitation, 6-MWT was explained to every subject. It was done along 21-meter straight corridor of the Cardiovascular Research Institute. Pre and post testing , resting HR and Blood Pressure (BP) of patients were reduced . Then, the intervention group started with CRP every week thrice for two months (24 sessions). The CRP included exercise therapy sessions, dietary wellbeing counselling and further prevention. Exercise therapy included both walking and stretching. It was done with the treadmills, ergometers, steppers and stair climbing, rowing, jogging and some instruments in the Cardiac Rehabilitation Centre under the guidance of a Medical officer, an exercise therapist and a nurse. Each session consisted 90

minutes, adding a 20-minute warm-up 60 minutes of walking and muscle training and lastly a 10-minute cool-down. Depending upon the practical situation, the depth of therapy was developed within 60–85% of maximum HR. Following all consultations, resting and maximum HR, and resting and maximum SBP and DBP of subjects were maintained within the limits by a nurse , without any untoward events for subjects with Rehab sessions . At the end of rehab programme, echocardiography, exercise test and 6-MWT were taken and final analyses were compared. Finally, all data were inferred and analyzed to assess the effects of Rehab programme. The level of significance was drawn at $P < 0.05$. Inference showed that exercise training in patients after CABG helped to lead more active lifestyle.

According to Ching Lan et al[60], Taiwan, Brief exercise therapy for subjects with CABG surgery proved improvement of cardio respiratory physiology, muscle endurance, lipid function, cardiac physiology, improvement in ventilation, hemodynamic physiology and QOL. In addition exercise therapy improved graft site, reduced cardiac incidents. So, Cardiac Rehab exercise therapy is an essential treatment and it must be prescribed to all subjects after surgery.

Exercises done for more than 20 minutes showed favourable improvement on both body and mind related domains .It is not proved for the physical functioning of the sub domain. Regular Therapy done after CABG surgery enhances the psychological health, as it helps mental enhancement . It decreases the stress level of the subjects. Usually, the QOL score improves with exercise therapy after CABG surgery . Subjects, despite the studies have not supported that survival of QOL should not be considered as per with repeat

vascularization[61]. After discharge of CHD Subjects, they were kept under Supervision for proper follow up. They were followed through telephonic conversation by the Nurse. Same conclusions were obtained considering the need for having support system which was needed to calculate the improvement in bodily and psychological domains of CHD Subjects[62].

The Centre of Disease Control and Prevention suggested that medical technologies have paved a way to advanced therapy of disease and a improved life expectancy. Estimating health benefits with treatment considered to focus on survival of life but the improvement of persons survival because of quality. An adaptive definition of QOL is the QOL theory which stated that persons reported experience of their wish, objectives and needs valued in parts of life such as health, which is attained, would balance their life fulfilment[63].

Every person who had CVD should be given education to adapt a part of diet which will decrease the chance of reoccurrence of cardio vascular disease. Total fat in the diet must be minimised to <30% of calories, saturated fat to <10% of calories and trans fatty acids should be limited. All dietary lipid should be poly unsaturated (10%) or mono unsaturated (15%) of calories. Every person should be motivated to decrease salt intake to at least one third to <80 or <90mmol. Every person should be motivated to take least amount of 400g a day within range of fruits and vegetables as well as whole grains & pulse[64].

Healthy pattern and life style habits mostly go together. Habits such as smoking, eating and regular exercise are surely connected to health, life expectancy and cardiac disease. Lifestyle modification, consists of provision of

education techniques to obtain healthy lifestyle .Thus, cardiac rehab programme helps in avoiding heart disease. Cardiac disease may be a life altering process for most of the subjects without complete cure . It starts and finishes with being 'cardiac cripples'. It begins with reduced mental stability which leads to reduction of activity, leading to decline in physical capacity, which further decreases the confidence. Any cardiac disease occurrence should follow rehabilitation. It is an important long term process. A planned CR program enables the subjects to avoid ill effects of CABG. [65.]

Highly structured Rehabilitation programs will improve patient's quality of life and reduce the cardiac mortality rate. Patient education is an essential component in the care of patient within the hospital and in the community. It is a cornerstone of treatment in the structured rehabilitation program[66.]

Tsaloglidou etal[67] conducted in Aristotelian University, Greece (2010)" to find out the effectiveness of CR for patients after CABG nursing interventions. The Purpose was to explain the way the cardiac rehabilitation for CABG subjects could be organized by assigning an effective role to the CR nurse. Results showed that the subjects with heart disease face many problems in their day today activities. Coronary Artery Bypass Graft surgery (CABG) is usually done to enhance the quality of patient's life. It helps to increase their life expectancy. To obtain better results of the surgical treatment, it is important that the subjects must be involved (in cardiac rehabilitation programme after the surgery . The cardiac rehabilitation programme involves four phases namely exercise training, drug treatment , psychological input and risk factor modification, as well as teaching dietary management. The study concluded that nursing professionals need to

educate the subjects about rehabilitation programs and insist on to join in them .It helps to regain activities of daily living.

A systematic review was conducted by Mares[68] in the University of Sydney" to identify the efficiency of nurse initiated cardiac rehabilitation programs after coronary artery bypass graft surgery. It showed that among 20% of 1048 patients again admitted within the half an year of discharge were from the CABG patients. CABG surgery was the usual reason for further admission. Same study enlighten the essentials of patients joining in cardiac rehabilitation (CR) .It was also prescribed by professionals for further treatment for CVD. Treatment includes medical prescription, reducing risk factor, provision of education, modifying behaviour and monitored physical activity coaching. It depends upon weeks, months or years to show maximum benefits in subjects. Health-Related Quality of Life (HRQ_O L). CR programs provide the chance for treatment based benefits with nurse practitioners. Nurse- initiated CR programs are handled and treated only by nurses to care and manage, assess and introduce patients to other health care providers as required. Nurse-led services maximize quality of care to manage subjects with developed CHD.

Cardiac rehabilitation is a way by which all the subjects with cardiovascular disease are motivated and managed by a team of health professionals, to get and achieve maximum physical and psychosocial health. Cardiac Rehabilitation (CR) includes counselling programmes to the subjects about cardiovascular risk and to motivate them to provide needed lifestyle modification[69]. Some studies on cardiac rehabilitation have proved that all causes of death rate are reduced considerably by 27% and mortality by 31%[70-71] due to cardiac rehabilitation programme. Studies

have reported the CR in connection with reoccurrence of symptoms and readmission rates. The reducing time of hospital admission for all heart patients produces a better result for a valid follow-up. Cardiac rehab nurses have the responsibility to face this challenge and provide such a service. Mental function, quality of life, improved social response and resuming the job are all facilitated by patients involvement in a CR programme[72].

Good news however, is that making these simple changes to lifestyle today, even reverse heart disease and prevent a potentially painful, life threatening attack. It provides a place for successful cardiac rehabilitation and enhanced health and well being to all subjects. Cardiac rehabilitation is largely followed everywhere in the world as secondary preventive measure for initiation of health and also rehabilitation . But, the idea has not been accepted by everyone in India. The present study is expected to create greater focus on a comprehensive cardiac rehabilitation programme for the greatest benefits of the CABG patients.

Hence, the Researcher is motivated to undertake the study.

STATEMENT OF THE PROBLEM

` A study to assess the effectiveness of cardiac rehabilitation programme on activity tolerance, selected physiological parameters (Heart rate(HR), Electrocardio gram(ECG))and quality of life among hospitalized CABG surgery patients in government Rajaji hospital, Madurai.

OBJECTIVES

- To find out the pre test and post test activity tolerance, selected physiological parameters (Heart rate(HR),Electrocardiogram (ECG))and quality of life of patients with CABG surgery in experimental and control group.
- To findout the effectiveness of cardiac rehabilitation programme in terms of activity tolerance, selected physiological parameters (heart rate, ECG) and quality of life of patients with CABG surgery.
- To findout the relationship between activity tolerance of the patients with CABG surgery who received cardiac rehabilitation programme and their quality of life.
- To findout the relationship between physiological parameters (heart rate, ECG) of the patients with CABG surgery who received cardiac rehabilitation programme and their quality of life.

HYPOTHESES

1. The mean post test scores of activity tolerance of the experimental group who received cardiac rehabilitation programme will be significantly higher than their mean pre test score.
2. The mean post test scores of activity tolerance of patients with CABG in the experimental group who received cardiac rehabilitation programme will be significantly higher than the mean post test score of control group.
3. The mean post test scores of selected physiological parameters (heart rate, ECG) of the experimental group of patients with CABG who received cardiac rehabilitation programme will be significantly higher than their pre test score.

4. The mean post test scores of selected physiological parameters (heart rate, ECG) of the patients of the experimental group with CABG in the who received cardiac rehabilitation programme will be significantly higher than the mean post test score of control group.
5. The mean post test scores of quality of life of the experimental group of patients with CABG who received cardiac rehabilitation programme will be significantly higher than the pre test score.
6. The mean post test scores of quality of life of the experimental group of patients with CABG who received cardiac rehabilitation programme will be significantly higher than the mean post test score of control group.
7. There will be significant positive correlation between activity tolerance of the experimental group who received cardiac rehabilitation programme and their quality of life.
8. There will be significant correlation between physiological parameters of the experimental group who received cardiac rehabilitation programme and their quality of life.

OPERATIONAL DEFINITION

Effectiveness:

It refers to the extent to which the cardiac rehabilitation programme will achieve a desired result among patients with CABG interms of activity tolerance, physiological parameters (heart rate, ECG) and quality of life regarding further management.

It is the difference between mean post test activity tolerance, physiological parameters(HR,ECG) and Quality of life scores between the experimental and

control group and it is measured by duke activity status index ,heart rate, ECG and SF36 questionnaire.

Coronary Artery Bypass Graft:

Coronary Artery Bypass Graft is a surgical procedure done to relieve angina and decrease the risk of death from coronary artery disease. Arteries or veins from elsewhere in the patient's body are grafted to the coronary arteries to bypass and enhance the blood supply to the coronary circulation supplying the myocardium (heart muscle).

In this study 100 patients who had underwent coronary artery bypass graft surgery were selected.

Cardiac Rehabilitation:

According to AHA[73], Cardiac rehabilitation is defined as cardiac rehabilitation, as a Secondary prevention programs .It should have specific core components that aim to minimize cardio vascular risk, adapt healthy behaviour, reduce disability to promote active life styles of patients with cardiac disease.

In this study, cardiac rehabilitation refers to programme which aims at reducing cardio vascular risk, adoption of healthy behaviours and active life style practices for patients who underwent coronary artery bypass graft.

Interventions include planned teaching about wound care, dietary management, adherence to medication, follow up, sexual relationship, dietary management, adherence, and demonstration of stretching exercises which include upper back stretch, chest stretch, lower back & waist mobility, calf stretch, hamstring

stretch and abdominal breathing &coughing technique, use of incentive spirometry, counting pulse rate, and stress management techniques like progressive muscle relaxation and suhasan.

Activity Tolerance:

According to Mosby's Medical dictionary,[74] it refers to the type and amount of exercise a patient may be able to perform without undue exertion or possible injury.

In this study it refers to optimum level of functioning in terms of ability to perform 12 common activities of daily living such as personal care, ambulation, house hold tasks, sexual function with respective metabolic equivalent costs. It has been measured by Duke Activity Status Index. It is a 12 item questionnaire.

Quality of Life:

According to medical dictionary,[75] it refers a patient's general well being including mental status, stress level, sexual function and perceived health status.

In this study, it refers to the multitude subjective and objective experiences of the patient to perform day-to-day activities in terms of physical functioning, role limitation, role limitation emotional, energy and fatigue, emotional well being, general health, pain and social functioning. It has been measured by SF 36 questionnaire.

Selected Physiological Parameters:

In this study selected physiological parameters are HR and ECG.

Heart Rate:

According to Wikipedia[76], heart rate is the speed of the heart beat measured by number of heart beats per unit of time typically beats per minute.

In this study, heart rate will be measured in the site of 5th intercostal space by stethoscope.

ECG:

According to Lewis[77]it is a graphic tracing of the electrical impulses produced in the heart.

In this study, changes in the graphic tracing of electrical impulses produced by the heart before and after 8th week of CABG surgery have been measured.

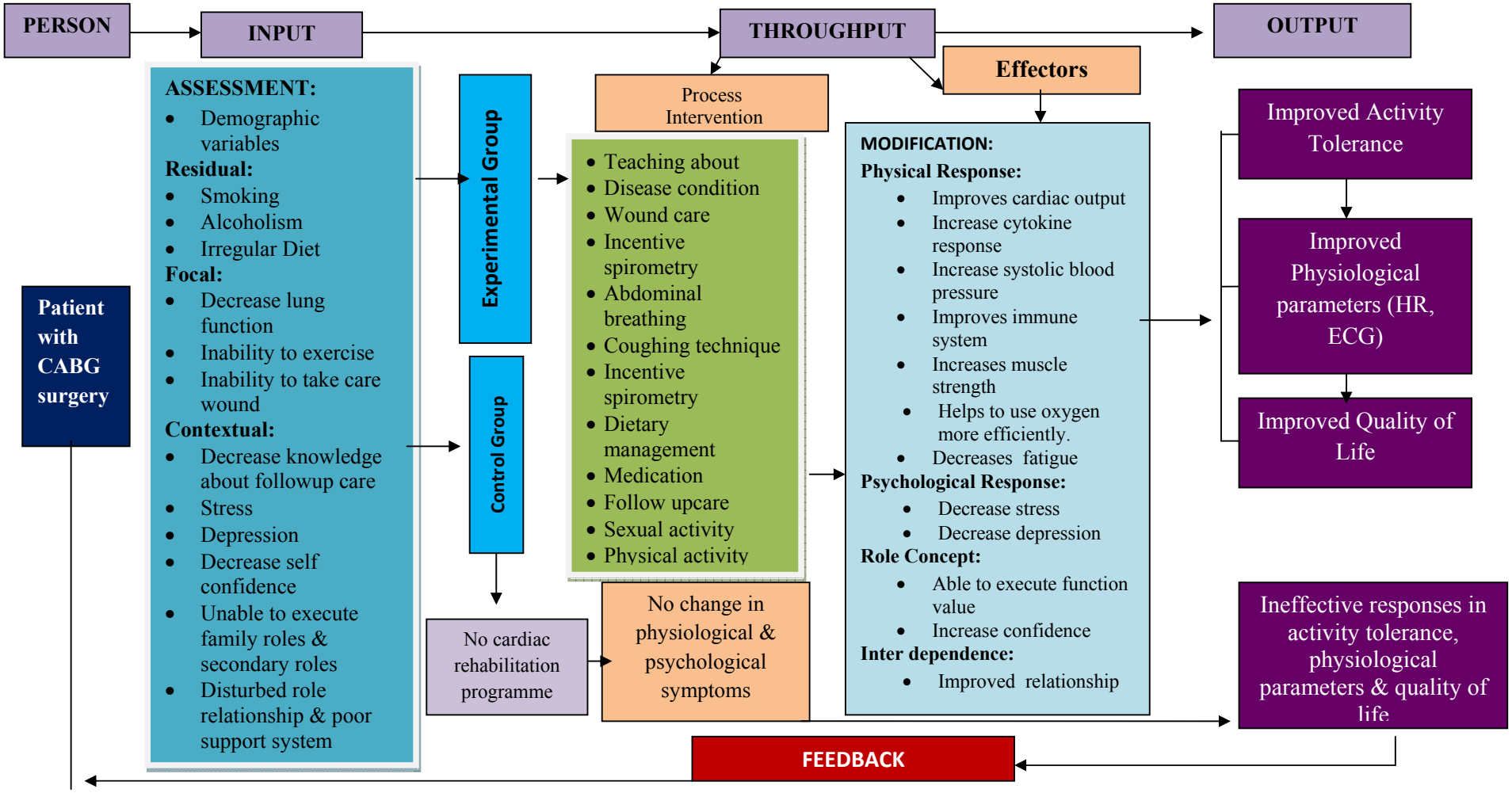
Assumption:

- Nurses are in the best position to provide rehabilitative care.
- Exercise improves cardiac output and the systolic BP increases because of cardiac output.
- Exercise helps to use oxygen more efficiently.
- Exercise helps to maintain temperature within normal range.
- Exercise helps to release cytokines and helps to increase blood cells and lymphocytes there by improving the immune system.
- Knowledge has a strong influence in adoption of healthy behaviour.

Limitations of the Study:

- Data collection period was limited to 1 year
- Patients who have undergone CABG surgery during the period of data collection only were interviewed.
- Cardiac rehabilitation programme was administered for three days, from 5th post operative day to 7th post operative day only and followed for 2 months period.

Fig :1 CONCEPTUAL FRAMWORK BASED ON SISTER CALISTER ROY'S ADAPTATION MODEL



The conceptual framework of this study is based on sister Calista Roy's Adaptation Model[78] which involves four concepts, person, nursing, health and environment. The adaptive system has four components like input, processes, effectors and output.

Adaptive responses improve integrity and aid to reach the objectives of adaptation, which consists of mastery, survival and growth. Activity tolerance and physiological parameters (HR, ECG) are also the variables.

In the current analysis, health related QOL was treated to be a hidden variable that show cases entire response of the adaptive system to environmental stimuli.

Person:

Roy states that the receiver of nursing care may be an individual, a family, a group, community or a society. Each considered as an adaptive system. In this study, the focus will be on the individual (patient with CABG surgery).

Regulator and Cognator Subsystem:

The constant interaction of person with this his/her environment is characterized by both internal and external change, with this world. Person must maintain his/her own integrity. Both the sub system consists of input, process and output. Regulator subsystem controls internal process related to physiologic needs. Cognator subsystem controls the internal process related to cognitive function such as perception, information, processing, learning from the past experience, judgement and emotions. In this study, the regulator and cognator sub system are considered cardiac rehabilitation helps the person to adopt changes internally.

The focal stimulus is the one major confronting with the person. In this study patients after CABG surgery, may experience inability to exercise and lack of knowledge on care of surgical wound. Contextual stimuli are all other stimuli directly attribute to adaptation. In this study, Focal system refers to decrease knowledge about self care, confidence, stress and depression. Residual factors are factors that are not known that may attribute in adaptation. In this study, smoking, alcoholism, and irregular diet life style modification are referred to adaptive stimuli. Because of surgery patient may unable to execute family roles and secondary roles and they have disturbed relationship and poor support system.

Input:

It is a stimuli coming from the person. In this study assessment of activity tolerance is analysed by Duke Activity Status Index and physiological parameters (HR, ECG) and quality of life is analysed by Sf 36 questionnaire.

Process:

According to the theory, process refers to the adoptive changes taking place internally (cognator and regulator subsystem) rearm in the system.

In this study, process refers to the administration of cardiac rehabilitation programme (planned teaching includes - wound care, dietary management, adherence of medication, follow up, sexual relationship & counting pulse rate) (demonstration includes - of stretching exercises, upper back stretch, chest stretch, lower back and waist mobility, calf stretch, hamstring stretch) and abdominal breathing and coughing technique, use of incentive spirometry, and stress management techniques like progressive muscle relaxation & suhasan reduction in severity of both physiological

and psychological symptoms which improve cardiac output, increases cytokine response and systolic BP, improves immune system & muscle strength. It helps to use oxygen more efficiently. In psychological response, it decreases fatigue, stress and depression. Perceived & learned experience like progressive muscle relaxation technique, Yoga will be helpful to decrease stress & depression. Exercise will reduce fatigue, improves role functioning and social functioning and overall its improves wellbeing.

Output:

Output is the outcome of the system, the system is a person. Output is the person's behaviour. Output is categorized by adaptive or ineffective responses.

In this study, the positive or negative responses to cardiac rehabilitation programme becomes output. In this study positive response refers to improved activity tolerance, physiological parameters (HR, ECG) and improved quality of life. In the case, the negative result becomes the feedback, where assessment has to be conducted & be treatment approach modified accordingly.

CHAPTER - II

REVIEW OF LITERATURE

The review of literature is a research report and is a summary of recent knowledge about a specific topic. It involves what is existing already and not existing in the topic under study. Related literature is viewed several times to know about the subject under the field of study. It provides a link between the researcher and the studies undertaken in the past and current researches in a particular field of study.[79]

A Researcher can never conduct a study in intellectual vaccum. He has to make use of the content of an existing base of knowledge for his/her Research . Literature review enables the researchers to gain familiarity with the topic undestudy[80].

For the present study, the review of literature has been done from the published articles, textbook, reports and Medline search. Literature review is organized and presented under the following headings in this chapter.

1. **Literature and studies related to overview of coronary heart disease,**
    a. Prevalence of IHD
    b. Risk factors
    c. Pathophysiology
    d. Assessment
    e. Medical Management
    f. Surgical management

2. Literature and studies related to CABG
3. Literature and studies related to complications or problems encountered after CABG.
4. Literature and studies related to cardiac rehabilitation
    a) Activity tolerance
    b) Physiological parameters
    c) Quality of life
    d) Life style modification
5. Literature and studies related to nurses role in cardiac rehabilitation

Reviews related to overview of Coronary Heart Disease:

The terms" Coronary Heart Disease (CHD), Coronary Artery Disease (CAD) and Ischemic Heart Disease (IHD) all refer to diseases of the heart that result from a decrease in blood supply to the heart muscle. CAD is the result of atherosclerotic lesions that develop in the coronary arteries. These lesions obstruct the flow of blood to the coronary vessels [81].

A) PREVALENCE:

The problem of CHD is prevalent in the whole of earth:The mortality due to CHD has plummeted in developed nations but the case of developing nations is the opposite. It is attributed to a small extent to the factors: the polluted environment, adapting to an unsuitable lifestyle and even due to the demographic changes. An estimate says that in the present times, an approximate of 3.8 million men and 3.4 million women worldwide die from CHD, per year[82]. The Global Burden of Disease Study[83]stated that the developing nations alone contributed about3.5 million of the 6.2 million global deaths CHD in 1990. It has also stated that these nations would

probably account for 7.8 million of the 11.1 million deaths because of CHD in 2020".

In India and China, there is a gradual increase in the number of premature deaths In forthcoming decades it is expected to be a picture of 30 million and 35 million in India and China, respectively by 2020.The previous statistics was being lower than 25 million premature deaths in each nationin1990.On the contrary, it has been reduced from around 20 million to 15 million Disability Adjusted Life Years in developed countries. The difference between super powers and developing countries would specifically increase and the strain of CVD in terms of premature deaths will significantly target developing nations in the coming 20 years. In various regions of the earth, the progression of the CHD epidemic isso very diverse in terms of pattern, amplitude, and appropriate time[83].

In India, cardiovascular diseases are the commonest reason for death rates. They are responsible for approximately half of all mortality caused by Non-Communicable Disease (NCDs). Ultimately, In 2008, CVDs were responsible for approximate of one in four of deaths in India. CVD is anticipated to be the commonest long term sickness for the period of 2005 and 2015, increasing at the yearly rate of 9.2%, and claiming the second greatest number of NCD patients next to psychological sicknesses. Further, the sorrowing truth is that the occurrence of CVDs has increased remarkably in people in the ages of 25 to 69 to a 24.8%, meaning the loss of productive part of the population[84].

According to 2010 Statistics, there was a large discrepancy in the incidence and death rate of CVD in various parts of India. CVD death rates ranged from 75-100/100000 in sub Himalayan states of Nagaland, Meghalaya, Himachal Pradesh and

Sikkim and to a higher 360-430/100000 in Andhra Pradesh, Tamilnadu, Punjab and Goa. Kerala has even higher CAD and CVD death rate[85] .Greater disparities in CVD deaths are found within the various regions of the Indian sub continents .The factors attributing to this type of differences are the diversities in food habits; ie) the intake of fats, dairy products, sucrose rich substances and greens along with criteria of overweight are responsible for this change[86].The Framingham Heart Study (2010) reported where respectively 6.5% and 13% of people living in urban places and respectively 16% and 7.4 % village dwellers in India were dwelling with CHD and men and women were mostly same with CHD [87].

A project in rural Andhra Pradesh found that 32% of all mortalities in that region were qualifiable to heart diseases and in that 6.6% of the subject over 30 years of age had cardiovascular disease. Few studies have been undertaken inside the state of Tamilnadu, especially in rural areas. Same study specified 24% death rate because of cardio vascular disease in the villages of Tamilnadu[88].

B) RISK FACTORS:

According to Long and Phipps [89] Risk factors of CAD include non modifiable factors like age, sex, race and family history. Modifiable factors are smoking, hyperlipidaemia, Diabetes mellitus hypertension, obesity, lack of exercise, stress, and oral contraceptive.

Joyce and Black [81] viewed that non modifiable risk factors of CAD are hereditary and age, while modifiable risk factors are such as cigarette smoking, hypertension, elevated serum cholesterol, DM, physical inactivity and obesity whereas contributing risk factors are stress and homocystein level.

Cardiovascular Risk Assessment:

The Actual and Global Assessment of Cardiac Risk Forms (AGACRF) has created a great awareness on avoidance and treatment of cardiac disease[90-92]. The importance of accurate assessment of risk for cardiac disease is being emphasized by the fact that patients without clinically evident CHD are at a higher risk of experiencing a cardiovascular event compared to individuals having a previous record of occurrence of heart attack.

Global Cardiac Risk Score Algorithms:

Various risk assessment tools to identify the risk factors of CVD are available. A patient's risk of cardiac disease can be assessed using the following algorithms:

Framingham Score Assessment:

According to Framingham assessment, and as recommended by the American Heart Association (AHA),[92"] the risk-scoring system estimates that risk of MI or coronary death could be predicted within 10 years, independently for men and women"

PROCAM Risk Score:

This scoring system was prescribed by the International Task Force as a preventive measure for the Coronary Heart Disease, according to the German PROCAM Minister Heart Study,[93] this system approximates the reason of developing a life threatening or non- life threatening myocardial infarction or immediate death due to CHD in the next 10 years.

Table :2.1

Risk Factors Considered for Framingham and PROCAM Assessment

Risk Factors	PROCAM	Framingham
Age and gender	X	X
Cumulative fat		X
HDL-C	X	X
LDL-C	X	
Triglycerides	X	
Smoking	X	X
Systolic blood pressure	X	X
Diabetes	X	X
Family history of coronary heart disease	X	

Emerging and Extended Risk Factor Panel:

Apart from the conventionally established risk factors," a large number of non-classical factors have been identified in recent years that are involved with greater chance for coronary incidences. [91]

Table :2.2

Emerging and Extended Risk Factor Panel:

Emerging Risk Factor Panel[94]	Extended Risk Factor Panel
C- reactive protein [above 3mg/l increase risk]	Apo lipoprotein A-1[HDL]
Homocysteine[above 15below 30 high risk]	Apo lipoprotein B[<80-100mg / dl increases risk]
Lipoprotein (a) [high concentration increases risk]	Apo B / Apo A-1 ratio[TC /HDL ratio]
Genetic markers [to identify the genetic pre disposition]	Cystatin C[serum protein]
Increased coronary calcium score[above 350pg / ml increases risk	BNP or NT-pro BNP[natriuretic peptide< 100pg /ml increases risk]
	Albumin in urine [performed in diabetes mellitus , hypertension patient]

C) PATHOPHYSIOLOGY:

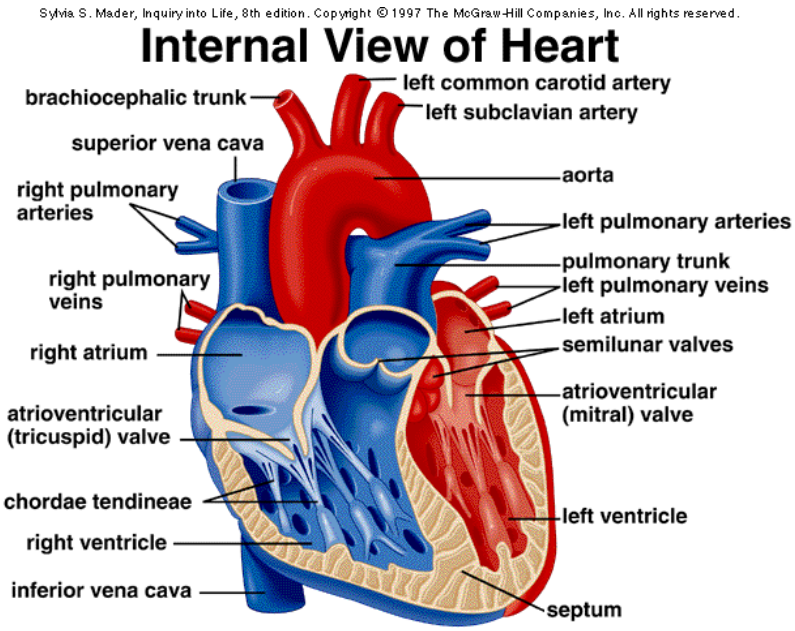
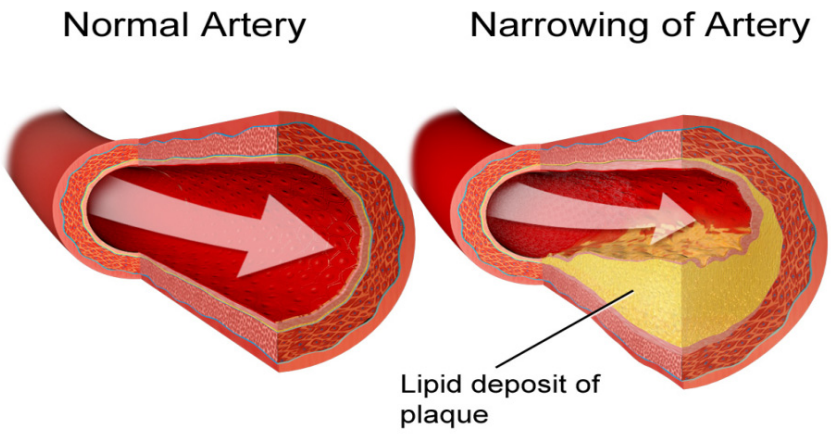


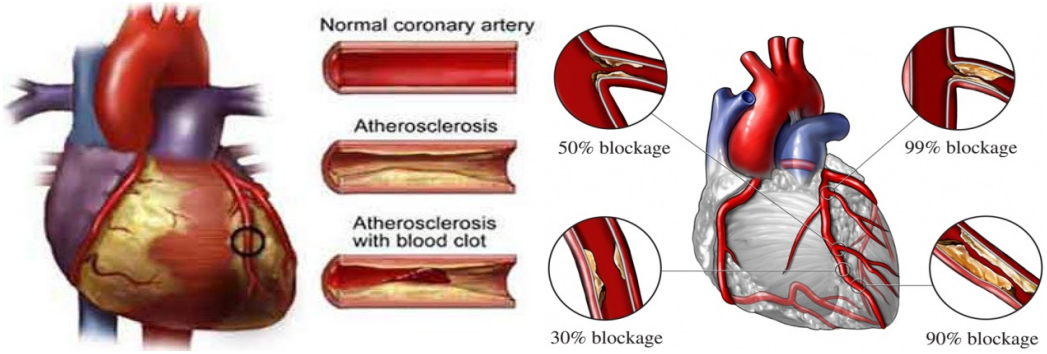
Fig: 2 Internal View of Heart



Source en.wikipedia.org

Fig: 3 Coronary Artery Disease

BLOCKED CORONARY ARTERY



Source www.thenewstribe.comaddhelium.com

Fig: 4.3 Percentage of Blockage in the Coronary Artery

According to Lewis[77], Atherosclerosis is usually described as thickening of the arteries. This situation can happen in any artery in the body, as the atheromas (fatty deposits) have a possibility for the coronary arteries .

Theories ofatherogenesis:

a. Endothelial injury - Endothelium is injured by hyperlipidemia, hypertension or chemical irritants.
b. Lipid infiltration: Lipid from the circulation enters the endothelium and accumulates in smooth muscle in response to mechanical or inflammatory trauma.
c. Aging: Atherosclerosis is evident for aging progresses.
d. Thrombogenic: RBC, platelet, lipids accumulate in arteries. The thrombus that alter endothelial permeability
e. Vascular dynamics: Mechanical factors (hypertension) increase intra luminal pressure, which leads to altered membrane permeability. Inflammation: The inflammatory reactions are consequences of infection of stimuli. The stages of involvement of atherosclerosis are 1) lipid streak 2) raised fibrous plague leading to smooth muscle cell proliferation and 3) complicated lesion.

Lipid streak is first grossly visible lesion in the development of atherosclerosis. It is characterized by lipid filled smooth muscle cells. Fibrous plaques are **t**he arterial wall deposition activated by endothelial injury caused by many factors which include increased BP, elevated blood lipid . Complicated Lesions are caused when the lesions continue to create a mesh of necrotic tissue that is

stiffened in the arteries causing toughness & firming. This lesion completely orpartly closes the artery.

Atherosclerosis of the Coronary Arteries

According to Jay Katz, O'Toole[95,] first the lower abdominal aorta and the coronary arteries are the commonest places of atherosclerosis. Within the coronary arteries, the dividing nodes use to build up the broadest formation of atherosclerotic plaque.

Atherosclerotic plaque developsin the form of a large mass within the arterial wall. Initially, this develops as aswell of a formation on the exterior of a coronary artery and growing through the artery's entire width. Finally, as the sickness develops, the plaque starts to swell into the lumen (interior passage way) of the artery. In this condition, the plaque decreases the efficiency of inner width of the artery. The Stenosis can be monitored with the help of angiography.

Atherosclerotic Artery with Narrowed Lumen

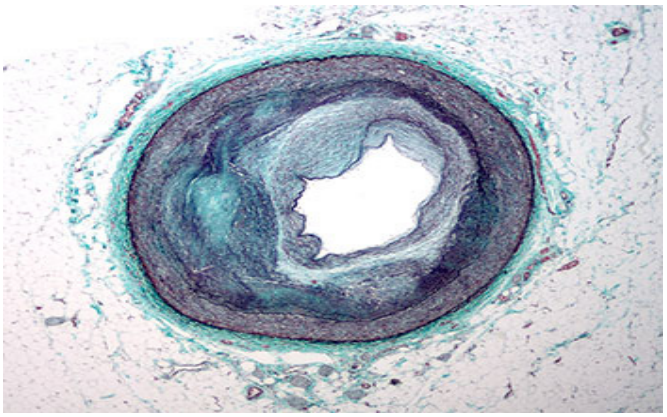


Fig 4.4. Atherosclerotic Artery with Narrowed Lumen

With the mesh of atherosclerosis and luminal reduction, the micrographic image of the distal right coronary artery. Source: Wikimedia Commons.

Antmal etal stated[96], that Coronary arteries which lacked 50% to 75% of their inner width cannot supply efficient flow of blood to accommodate the growing demands of cardiac muscle during physical activity; that stage of stenosis will progress to ischemic symptoms, usually angina, when the patient is physically active. If atherosclerotic plaque broadens enough to occupy 80% to 90% of the width of a coronary artery, ischemic heart symptoms grow, no matter of the subject being at rest.

In due course, the portion of blood vessel that is situated away from a crooked segment would expand and the remaining small collateral arteries would become large, leading to the formation of new collaterals. By these conditions, the arterial tree of the heart can contribute to an extent to the narrowed coronary artery when the stenosis has grown continuously.

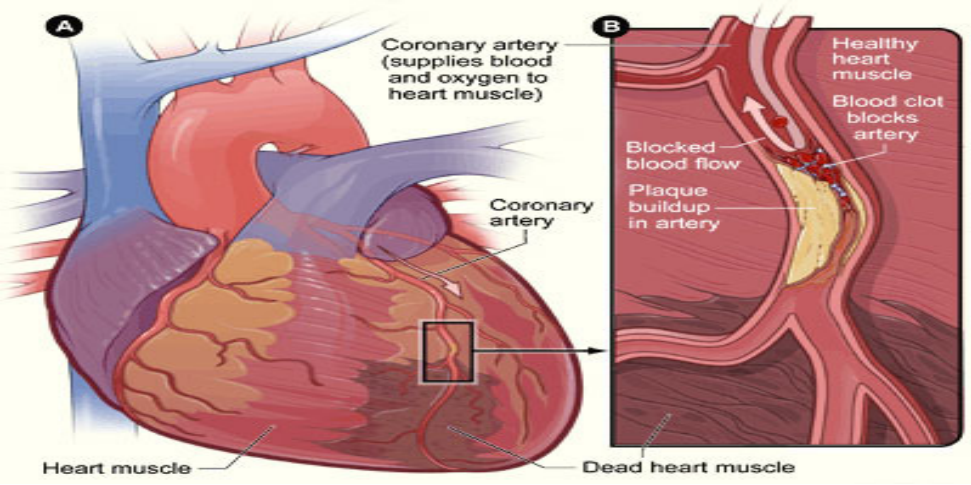
Though, no normal defence against immediate arterial narrowing like the obstruction occurred by coagulated material from a eroded plaque is available, instant narrowing can progress enough to ischemia that cardiac muscle is destroyed . This is the important usual reason for the death of cardiac muscle. More than 95% of all Myocardial Infarctions occur near blood clots and fragments from fatty deposit plaque.

Effects of Atherosclerosis on the Heart

Antman etal stated that usually, in cases where the cardiac muscle is burdened with work, the blood vessels of the heart lining, that is, the arteries downstream from the main coronary arteries expand to more blood flow to the muscle cells. But, if atherosclerosis has narrowed the coronary arteries, expansion of the downstream arteries is not adequate to avoid the lack of blood supply.

According to Burke and virman[97] the part of cardiac muscle which lacks the blood supply is based on which artery has been obstructed. Specifically ,about 50% of the Myocardial Infarctions are due to obstruction in the left anterior descending artery with 30% - 45% obstruction of the right coronary artery, and 15% to 20% caused by obstructions of the left circumflex artery (Burke & Virman, 2008). Following an immediate obstruction, the cardiac muscle cells which nourish near these arteries, suffer from lack of blood supply and in addition to that, they are hastily reperfused .This causes ischemic heart muscle cells to pass away between 20 minutes to 4 hours, on the active secondary flow.

Myocardial Infarct in the Wall of the Left Ventricle



Source: NIH 2012

Fig:4.5 Myocardial Infarct in the Wall of the Left Ventricle

Acute Coronary Syndromes

According to Brunner & Suddarths,[4] In case of **acute coronary syndromes**, the occurrences to initiate signs of illnessconsist of a change from the interior; particularly, an alter in the atherosclerotic plaque in the client's coronary arteries. When a patient suffers an astute coronary condition one or more of the following impacts may be created.

- Plaque gets extended, worn out or ruptured , or
- Fluid filled cavity gets enthused or out of order movable, or
- A coronary artery gets abruptly tight in the stoppage of blood flow.

As soon as the signs of fatty plaque development in the blood vessels erode or rupture, it can make thrombi to obstruct coronary arteries. At one side of the continuum of astute coronary syndromes, the immediate blockage could be provisional and apparent impulsively. This is known as **unstable angina**. Even though it could be important, the ischemia of unstable chest pain is adequately concise enough to prevent destroying heart muscle. Unstable chest pain is a caution hence extra hazardous change may happen and source of myocardial infarction or sudden cardiac death may happen.

They further say that ,'a the other side of the range of astute coronary signs of illness, the immediate arterial difficulty, cause adequate lack of blood flow to destroy muscles which is known as **myocardial infarction (MI, or heart attack)'.** This condition is next followed by the leakage of intracellular proteins from the destroyed cells. They flow in the bloodstream and would have intracellular proteins (cardiac biomarkers) specific to the heart in the blood. After heart muscle cells pass

away, intracellular proteins (cardiac biomarkers) specific to the heart enter into the blood flow and these proteins can be identified in cardiac biomarker enzymes . In all subjects, ECG waveforms indicate various changes in and behind a myocardial infarction. ECG changes can detect those myocardial infarctions that have an effect on greater parts of cardiac muscle; a condition which is at times, be enhanced by direct reperfusion procedures.

D) ASSESSMENT:

Numerous diagnostic procedures add to the information obtained from the history and physical examination of the cardio vascular system. "These procedures are usually classified as invasive or non-invasive. If only needle insertion for withdrawal of blood or injection of contrast media is used , this is usually considered non invasive. Catheter insertion for angiography is considered an invasive procedure".

Non-invasive Studies include:

Chest X-ray, ECG, ambulatory ECG monitoring (Holter monitoring, transcelephonic event recorder), exercise treadmill test, echo cardiogram, dobutamine cardiogram, transesophageal echo cardiogram, nuclear cardiology and MRI.

Blood Studies include:

CKMB, myoglobin, troponin and serum lipids (cholesterol, triglycerides & lipoprotein).

Invasive Studies include:

Cardiac catheterization, coronary angiography, intra coronary ultra sound, hemodynamic monitoring, electrophysiology & peripheral arteriography and

venography. In this study, ECG is also used as a parameter to rule out the effectiveness of cardiac rehabilitation programme[74].

Franklin [98] described that Duke Activity Status Index (DASI) is used to measure change in pre and post rehabilitation Consistently, self reported Metabolic Equivalent Test[MET] level of functional capacity, has been used to show the strongest predictor of cardio vascular mortality and independent risk factors for all cause of mortality. Patients in the lowest fitness quartile (highest risk) appear to gain the greatest health benefit from exercise training, that is among this group, even a modest improvement in fitness levels results in a significant reduction in mortality . Frankiln &Gorden[98 '] in his recent study indicated that for each, MET increase in fitness, there is a corresponding decrease in cardiovascular mortality of 8-17'%.

Pre and post surgical treadmill testing is used to determine the degree of improvement in post operative period by examining the rate pressure product at the point of ST depression[99]

AHACVPR [100] stated that the SF 36 is an acceptable tool to use in the CR setting along with pre & post improvements in functional status and quality of life. General health, social functioning and vitality have note worthy correlations with both physical and mental health components and should be evaluated individually as well. It is recommended for the CR professionals to examine Health Related Quality of Life (HRQL) to assist where necessary for providing resources to improve social, physical, mental & role function .

E) MEDICAL MANAGEMENT

Medical management is advised for cardiac patients before and after CABG with the following medications.

Asprin[101] - It acts as an Anti platelet agents. It helps to reduce blood cloting - S*ide effects* include stomach pain and unusual bruising on body.

Clopidogrel is used to treat a recent attack with unstable angina. Both Aspirin and Clopidogrel have the same action. Combination of both drugs is used in treatment of CAD. It helps to lower blood pressure. S*ide effects include* dizziness, fainting, headache and vomiting ACE inhibitors (captopril) -. Patients with chronic stable Angina may benefit from addition of ACE inhibitors. Side effects include dizziness, fainting, headache, nausea, and vomiting. It is a standard drug therapy for ventricular dysfunction in DM patients.

Beta blockers (Atenelol, Metaprolal)- It helps to slow the heart rate. It should be avoided by patients with Asthma *Side effects* include Dizziness , constipation , itching, sleep problems, depression , impotence and cholesterol..

Cholesterol lowering medications (simvastatin, Atorvastatin) are used to treat high level of cholesterol in the blood. Side effects include diarrhea, constipation, skin rash, and tiredness.

Nitrates such as Glycerol Tri Nitrate are used to relieve pain and anginal attacks. Side effects include annoyance, giddiness and feeling a pulse in the head. Ortho static hypo tension is a complication of all nitrates. Monitoring BP is essential.

Calcium channel blockers (Amlodepine, Diltiazem). It helps to lower blood pressure and control heart beat .Effects include systemic vasodilatation with decreased SVR, decreased myocardial contractility and coronary vasodilatation. Side effects include Hypotension, edema and bradycardia .

Ranazoline - It helps to minimize the use of sublingual nitroglycerine in patients with Type 2 DM .It acts as a sodium inhibitor for Refractory Angina. Dose 500-1000mg twice daily .Ranazoline reduces the frequency of angina in CAD patients[102]

F) SURGICAL MANAGEMENT:

There are Several alternative treatment for CAD . They include,

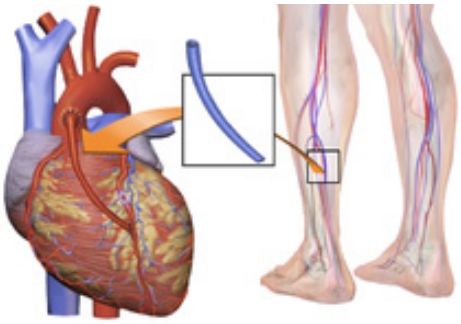
Percutaneous Coronary Intervention (PCI).and CABG. Both surgeries are additional successful than medical treatment, as they relieve the symptom (angina, difficulty in breathing , tiredness) [103] . CABG is better than PCI[104] .

Many authors have described that PCI is an emergency or elective procedure to relieve symptoms. It involves the insertion of a catheter in to a narrowed or stenotic section of a coronary artery, usually via a femoral artery; a balloon is then inflated to widen the stenosed area. A wire mesh tube or stent is often left in place to maintain the patency of the vessel. In suitable cases medically coated or 'drug eluting' stents may be used to prevent restenosis or an inflammatory reaction to the stent. PCI is less invasive. It is unclear whether long term results show advantage over optimal medical therapy for patients with chronic stable CAD. The procedure would appear inappropriate for a symptomatic patient or those with minimal impairment. It is less

effective interms of quality of life and if repeat revascularization is required for patients with multi vessel disease [105].

According to a report of Texas Heart Institute,[106] one more surgical method introduced for the exercise-limiting angina is with harsh long term stable chest pain. Laser trans myocardial revascularization denotes a laser to slice slim channels into the cardiac walls. It is considered that treating with laser provokes creation of blood vessels that are new, so that local blood supply to the cardiac muscle can be improved. It is also believed that the laser may destroy some of the nerves that are causing the angina.

2. LITERATURE & STUDIES RELATED TO CABG



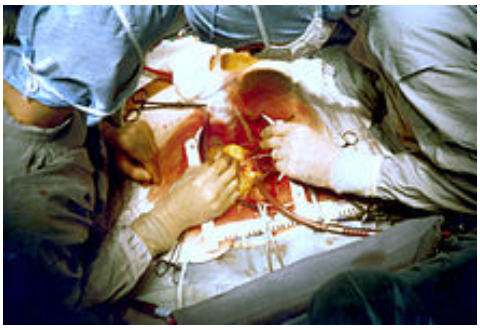


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Fig: 6 Coronary artery bypass surgery

Coronary artery surgical treatment is done to alleviate chest pain and decrease the danger of loss from coronary artery disease. Arteries or veins from another place in the subject's body are implanted to the coronary arteries in order to bypass narrowing's due to fatty plaque deposition in vessels and increase the flow of blood to the myocardium (cardiac muscle). The above mentioned surgical procedure

is typically performed when the heart is blocked. There is a surgical technique available with beating heart called off-pump treatment. This technique is called beating heart surgery.

Usually, the Left Internal Thoracic Artery (LITA) earlier called as Left Internal Mammary Artery or (LIMA) is implanted to the left anterior descending artery and a grouping of other arteries and veins is worn for other secondary arteries. The Right Internal Thoracic Artery (RITA), the great saphenous vein from the leg and the radial artery from the forearm are usually worn . These vessels are typically taken with the help of endoscope, by a technique called as Endoscopic Vessel Harvesting (EVH). The right gastroepiploic artery of the abdomen is rarely worn .

Graft Patency:

Grafts can get contaminated in the lengths of time following bypass surgery. Patency is the possibility that an implant leftovers open. It is necessary for an implant to be measured for its adequate blood supply, which is of great importance. If the supply of blood does not meet the requirements, then stenosis occurs. There are multiple factors responsible for graft patency; the category of graft worn (internal thoracic artery, radial artery, or great saphenous vein), the mass or artery present in the coronary circulation that the graft is connected with, and, of path the ability of the surgical procedure. Arterial implants (e.g. LITA, radial) are so much susceptible to hard treatment when compared to the saphenous veins . It may go into spasm if treated inappropriately.

Usually, the most excellent patency rates are obtained with the local left internal thoracic artery (the near end is left bypassed to the subclavian artery) with the distant end implanted with the artery present in the coronary circulation (Usually the left anterior descending artery or a diagonal branch artery). Smaller patency rates could be normal with radial artery implants and "free" internal thoracic artery implants (where the near end of the thoracic artery. It cut off its source from the subclavian artery and again-connected with the ascending aorta). Saphenous vein implants have poor patency rates, the positive being increased accessibility, as the subjects could have many branches of the saphenous vein worn to bypass unlike arteries. Veins used, either have separated valves or are twisted on. Thus the valves present, do not obstruct blood flow in the implant. LITA grafts are durable than vein grafts, as the artery is extra healthy than a vein. As it was previously linked to the arterial tree, the LITA requires only to be anastomosed at one of the ends. The LITA is typically anastomosed to the Left Anterior Descending Coronary Artery (LAD). For the reason that of its greater, chronic patency while evaluated with saphenous vein grafts[107-108.]

CABG produces more dramatic and rewarding relief from severe disability in majority of the patients. However, these patients are on greater danger for illness progression and recurrence of cardiac events such as angina, MI, repeat revascularization and death. Hence, CABG surgery is a stressor not only to the patient but also to those caring after them[109].

3. LITERATURE & STUDIES RELATED TO COMPLICATIONS OR PROBLEMS ENCOUNTERED AFTER CABG.

Direk and Celik[110], investigated on subjects who undergo coronary artery bypass implant surgery and their skill on caring themselves at home. Fifty three patients who underwent CABG surgery were included for data collection. The problem observed through the patients after discharging from the hospital are revealed below.

Table 2.3

Problems encountered by the subjects after discharge (N=53):

Problems	N*	%
Sleep-related problems	53	100.0
An inability take part	41	77.4
in activities	41	43.4
Fatigue weakness	38	71.7
An inability to recline	37	69.8
A refusal to see visitors	33	62.2
Wound-related problems	23	43.4
Respiratory distress	23	43.4
Pain around chest incision	18	34.0
Loss of appetite	18	34.0
Fear	16	30.2
Pessimism	14	26.4
Edema in the legs	11	20.8
Back pain	10	18.9
Introversion	9	17.0
Palpitations	6	11.3
Attention deficit problems	6	11.3
An inability to quit smoking	5	9.4
Constipation	5	9.4
Infection of the urinary system	12	22.2
Other**		

Foruzan Nia[111] studied the occurrence of sexual disturbances in men following heart surgery in Afshar Hospital of Yazd, Iran. Samples consisted of 279 men around 70 yrs who had undergone CABG and they were enlisted. They were interviewed before and 3 months later to surgery inregard to the effect of surgery in their sexual activities. Type of sexual abnormalities noted include impotency, early ejaculation and reduced or failure of libido in 6.5%, 4.3% and 9.3% respectably in that order earlier to surgery and 34.8%, 21.5% and 20%, correspondingly 3 months later to the surgery. Agreement of additional than one disturbance was not noted . They finished that Sexual dysfunction was usual following cardiac surgery. Sexual counselling was not enough to address properly. The researcher recommended that the duty and tasks of nurse become evidence to participate in counselling.

According to Lutchmedial and Smilovitch[112], ' Every patient will experience a little amount of tiredness after the operation. The tension due to the surgery and interrupted sleeping cycles will induce tiredness in mind, while fatigue of the body would effect from granulation of tissue and decreased haemoglobin levels due to surgery. Subjects must be comforted and asked to anticipate major tiredness for a minimum of 14days later to discharge with progressive development for the subsequent 30days.

A small quantity of disparity of the thorax and sternum is usual following CABG. Slight amount of sternal unsteadiness too is usual in the starting days after the operation. Subjects can experience sound or a progress of the border of the sternum with chest wall movement. Larger number of subjects of early instability of sternum would decide with a period sufficient for absolute healing of the bone. Healing of the wound and vein-implanted surgical area can frequently make

considerable itching. Incisional and sternal pain is one more usual problem in post-CABG. Pain in the sternum of any cause could be simply misleaded as chest pain, and could aggravate major worry. Previous to returning home, it is beneficial to inform a subject in proceed that angina bothered by sudden movement of sternum by abnormal breathing and strained cough is mostly musculoskeletal. Internal mammary grafts are linked with a specific pain process. Objective evaluation choice from insensitivity to a prick of the pin to a harsh skin allergy above the sternum. preceding to discharge, it is useful to advise a patient move forwards about all these symptoms[113].

Neurologic abnormalities: Motor weakness of the upper arms and legs are the largely usual signs. Signs contain specific abnormalities of spine specifically the C8 and T1 nerve roots, that include weakness of the upper extremities, especially hand.[114].

Depression is really frequent after CABG and is the cause for main coronary events. Around 20% occurrence of symptom of worrying due to a heart attack, and it is said that worrying is considerably underestimate in this subjects [115].

Sleep disturbances are frequent complaint in the postoperative periods , happening in over 50% of CABG patients. Split night time sleep may be because of incisional pain, complications in identifying a comfortable position and night time urination , change in sleep behaviour in hospital (daytime napping) may qualify to difficulty in sleeping after discharge. The patient may experience this for six months . It is essential to focus all these issues and they are important to get better sleep habits[116].

4. LITERATURE & STUDIES RELATED TO CARDIAC REHABILITATION

a. Activity Tolerance:

A retrospective analysis was carried out by Kennedy etal[117] in Northern Alberta, America in 2003 to identify the impact of a complete cardiac rehabilitation programme on quality of life and exercise acceptance among 126 women. The overall programme lasted for 7 weeks with supervised exercise education and life style change by their own. Exercise acceptance test was done by the modified Bruce treadmill protocols. Incremental Exercise Acceptance Test (E AT) was done by the standardized treadmill protocols. Patients perform the usual procedure of pre and post CR time intervals. Upper and lower limit of blood pressures were obtained when idle and throughout physical activity respectively Cumulative serum Cholesterol levels were obtained. The results were obtained by the end,3months and 2weeks later to the Cardiac Rehabilitation program. The findings showed that without limitation of age, females who participated with Cardiac rehab program showed higher rate of exercise tolerance. As an effect of this enhancement, they perceived that they were strong, had less exhaustion and were able to do their usual work better. The study concluded with the notion that marked developments were established subsequently in the quality of life steps later involving in the cardiac rehabilitation process in physical dimension and psychosocial dimension. Different age groups did not show major differences for any quality of life variable. Their progress was monitored in physical activity tolerance (+21%) and good cholesterol (+5%').

Poortaghp etal[118] identified the outcome of home based cardiac rehabilitation process on self efficacy of subjects of the CR unit at Tabriz, In 2009 in that cardiac

rehabilitation unit 80 patients were taking treatment. They were divided at random into intervention and control groups. Together they got CR care at rehabilitation unit. The intervention group obtained teaching and useful training with different rehabilitation process from the community health nurses during treatment time . "General self efficacy scale was used to assess self efficacy for all subjects during follow up periods". 'Practical training includes measuring HR, doing suitable exercise, home walking programme, education regarding risk factors, nutrition, taking medications and follow up. Before beginning the Rehab programme, General self efficacy scale differences were estimated between intervention(26.36 ±,-.84) .But in control group(28.53±.54)'. At last analysis GESE in intervention group was 36.9 ±5.65 and2.65 ±91 in control group. It was proved with prominent diversity in self efficacy and were drawn among experimental and control group in various time periods(p=.001). In view of the findings of this study it was concluded that home based CR had positive benefits on patients self efficacy' Therefore, they have suggested the need for suitable and successful training of patients, continuous care and regular follow up care in order to relieve them from difficulties.

Taylor etal[119] studied the exercise acceptance and quality of life with cardiac rehab with 8940 old age subjects after myocardial infarction in Wisconsin in 2003. They ' evaluated the efficiency of 2 months after Myocardial Infarction' (.MI).cardiac rehabilitation as Total Work Capacity (TWC) and Health Related Quality of life (HRQL). In subject – CR program included 40 physical activity sessions, 24 sessions of survival coaching on a treadmill (5minute warming up, 20mt post exercise monitoring) one hour session of muscle strengthening exercises. During two sessions, ECG was recorded by telemetry and exercise intensity was kept at a

maximum of 70-85% heart rate attained during base line symptom limited exercise test. The American College of Sports Medicine guidelines were followed for exercise test. Patients were educated on lifestyle modification strategies two times a week and were called to involve a monthly support group together with family members". The results confirmed that the measure of exposure and outcome ratio (or) <-0.80; 95(CI) 0.68 to 0.93 & cardiac death rate (OR -0.74; 95CI; CI 0.61 to 0.96); larger reduction in serum lipid level (weighed mean difference, -0.37mmol/L (14.3mg/dl) 95% CI -0.63 to 0.11 mmol/L (24.3-4.2mg/dl) triglyceride level (weighed mean difference -0.23mmol/L (-20.4mg/dl) 95% CI; -0.39 to -0.07mmol/L (-3.45 to -6.2 mg/dl) and systolic pressure (weighed mean difference) -3.2 mmHg -5% CI -5.4 to -.0.9mm Hg and low count of expressed smoking (OR 0.6495% CI 0.56 to 0.83). It was found that CR helps exercise acceptance for older age of 75 yrs to 86 years who have excluded previous trials. Home CR was the option for the older patients who had lower risk. After MI, hospital CR and home CR were the same as efficient in the small period and increased TWC and HRQL in all age.

The exercise protocol study was conducted in Buylor University Medical Center, Texas in 2007 by Simmist etal[120] on the subjects with coronary artery disease. The patients had in recent times undergone surgical treatment for myocardial infarction, or heart failure and they were included as participants. A sum of one forty eight assessment which was comprise result from the test which included 65 men ;and 38 women, The subjects were divided in two groups: that is subjects who did not regularly participate in the study and those who finished the whole cardiac rehabilitation process(pre test, program, and posttest; referred to as the entire-protocol group). Pretest and posttest results among the entire-protocol group

were analysed down with grades of male and female. The important methods calculated for highest heart rate was Rapid Perceived Exertion, systolic and diastolic blood pressure, and greatest METs. They calculated from analysis of one exercise acceptance assessment done in a cardiac rehabilitation program between 103 subjects: 65 men with a average age (60.5 years)and 38 women with a average age(62.4 years). Conclusions denoted that, following cardiac rehabilitation, subjects had notable progress in maximum functional capacity (an increase of 0.9, $P < 0.0001$), which denotes perceived ability and a progress in rate of perceived exertion (lessened about 1 point which was not analytically notable), that denotes additional tolerance at the similar occupation cadre. In a common male marked development than a female is proved on different product analyses. In addition, the examining procedure revealed to be secure. Values of blood pressure were not more than 188/86 mm Hg, and maximum heart beat were not more than 165 beats per minute. They concluded that the improved training of exercise test prior to and following cardiac rehabilitation aids to accelerate the progress of a uniform physical activity acceptance practice to maximize subject treatment and improvement and record outcome for male and female subjects during entire treatment process .

A study was conducted at North Eastern University, Boston (2010) by Dinon[121] to identify the" Efficiency of a Three Month Cardiac treatment Program on Cardiovascular stamina, Ejection Fraction, and Quality of Life . This retrospective analysis examined the Left Ventricular Ejection Fraction (LVEF), Activity tolerance plu which Short Form 12 questionnaire (SF-12) of 50 individuals following a three-month cardiac rehabilitation program was done. Men and women between 40 and 75 years of age who had an uncomplicated myocardial infarction in the past four weeks

prior to cardiac rehabilitation and a LVEF between 25-45% participated in the study. Participants underwent LVEF, 6MWT, and SF-12 and tests both baseline and following the three-month program were only included. The cardiac rehabilitation program included the treadmill, recumbent cycle and upper body resistance training which were performed three times per week with 45-60 minutes per session. There was no statistically significant change in LVEF following the three-month program (pre: 45% and post: 48%) in seven participants. The results of the SF-12, completed by 36 participants, indicated that the Physical Component Scale (PCS) improved significantly after cardiac rehabilitation (pre: 39.4 and post: 44.5), while the Mental Component Score (MCS) did not inform (pre: 51.5 and post: 54.1).According to Dinon, Submaximal exercise endurance, measured by 6MWT, completed by all 50 participants, improved significantly after the program, with an average increase of 15% on the 6MWT. In conclusion, this three-month cardiac rehabilitation program improved exercise endurance and the PCS of the SF-12 of participants after a recent uncomplicated heart attack, but did not significantly change LVEF or the MCS of the SF-12.

Balir etal[122], UK (2010) showed that patients who participated in the CR program had major reduction in death and morbidity including development in exercise acceptance and symptom " Serum cholesterol levels, blood pressure, psycho social health and improvement in the frequency of angina along with self reported chest pain on movement and shortness of breath, also improvement in QOL of the cardiac patient were modest and varied in terms of treatment process. However, home based CR seems to be safe and effective. They concluded that home CR program had very good improvement of bodily action level comparably to

institution based treatment. It was uniformly efficient in recovering cardiac threat issue.

b. Physiological parameters

A study was conducted between August 2008 and Feb 2009 in Tehran Heart Centre, Iran, by Sheikhvatan etal[123] to enquire the relation among systolic blood pressure response and exercise index following whole cardiac rehabilitation program' (CR). 352 subjects were subjected to Coronary Artery Bypass Grafting (CABG) surgery and were given symptom-limited exercise testing instantly prior to and also following the conclusion of the Cardiac Rehabilitation programme. Results showed abnormal values. SBP recovery following exercise was a physically powerful interpreter of physical activity attribute in the previous session. Counting maximum oxygen capacity (β=-0.617, SE=0.127, p value < 0.001) and peak O2 intake (β= -1.950, SE=0.363, p value < 0.001) calculated in the preceding session modified for baseline physical activity parameters, underlying characteristics, along with left ventricular ejection fraction. The rehabilitation program took place for 15-30 days after CABG for a whole period of 60days. The Study emphasized the predictive role of baseline systolic blood pressure recovery later to physical activity in analysing exercise parameters following CR. This baseline index can predict abnormal peak O2 consumption, heart rate later to physical activity, and heart rate recovery after a 24 session CR program.

Jelinek et al [124] evaluated the effectiveness of CR on enhancing exercise tolerence (6MWT), cardio respiratory task (peakVO_2), and autonomic role, Heart Rate Variability (HRV) subsequent to either cardiac bypass surgery (CABG) or Percutaneous Coronary Revascularization (PCI) was not known. Their study

consequently evaluated the alteration in 6 minute walk test, peak oxygen consumption and Heart Rate Variables subsequent 45 days of Cardiac Rehabilitation program also with the subjects of PCI or CABG. 38 subjects, (PCI, $n = 22$ and CABG, $n = 16$) were involved in the Rehab process . Furthermore conclusions for previous and after 6 min walking analysis (6MWT), peak oxygen consumption and heart rate variability (HRV) were included . Their analyses proved that a 45 days program next either to PCI or CABG increases the outcome. But, the result on post-CABG differ to that of post-PCI subjects. Alteration in distance covered (6MWT, metres) was larger in the CABG (Δ6MWT: 61, $p < 0.001$) evaluated to the PCI group (Δ6MWT: 41, $p < 0.001$). Highest functional tolerance (peak VO_2, ml/kg.min) too remarkably improved with a major positive outcome in the CABG group (ΔPCI: 0.7, $p < 0.001$; ΔCABG: 1.0, $p < 0.001$) however did not arrive at ordinary values pertaining to people. Though development in HRV attributes was observed for the people who underwent PCI group, analytically major progress in HRV was noted only in the CABG group for the following; Standard Deviation of RR Intervals (SDNN) (ms) (Normal vs. post-rehabilitation (median ± IQR): 31.2 ± 25.6 vs. 51.8 ± 23.1, $p < 0.01$), Route Mean Square Standard Deviation (RMSSD) (19.32 ± 19.9 vs. 42.1 ± 34.2, $p < 0.01$); LF (ms^2) (191 ± 216 vs. 631 ± 693, $p < 0.01$) and HF (107 ± 201 vs. 449 ± 795.0, $p < 0.05$). An important communication in the subjects who underwent PCI surgery although not in the CABG group was experimented by association between the 6MWT and peak oxygen consumption with HRVattributes denoting that being stronger that is, a improved 6MWT and peak oxygen consumption led to enhanced HRV grades though not important result of CR in the PCI group. Grades were analysed for 6Minute walk test and peak oxygen uptake was tested by an analysis. A marked benefit of Rehabilitation on HRV attributes was

taken in the CABG group (p = 0.0072). The study denoted that a 45 days Cardiac Rehabilitation program for both groups in terms of physical activity tolerence, cardiorespiratory function following autonomic nervous system influence of heart rate, with CABG subjects viewing the main progress in HRV was a helpful added variable to measure cardiac function following CR".

Ejection fraction is the indication of the blood coming out of the heart at every contraction. Cardiac rehabilitation programmes often will note improvements in patients with ejection fraction. Through building structured exercise many can improve the muscular strength of their body and thus reducing the effort the heart has to work to meet the demands for oxygenated blood.

Exercise does improve the ejection fraction in many studies, but if it doesn't it still improves the functional ability and quality of life of most individuals. Cardiac Rehabilitation programs often will note an improvement in patients ejection fraction. It is typical to undergo echo cardiogram studies approximately three month post intervention or event. It also gives time the heart time to recover and medical management to be fully effective This is typically how long a cardiac rehabilitation program lasts. The cardiac rehabilitation programme encourages them to increase their workloads, as their ejection fraction is likely much improved and now can feel safe pushing the intensity.[125]

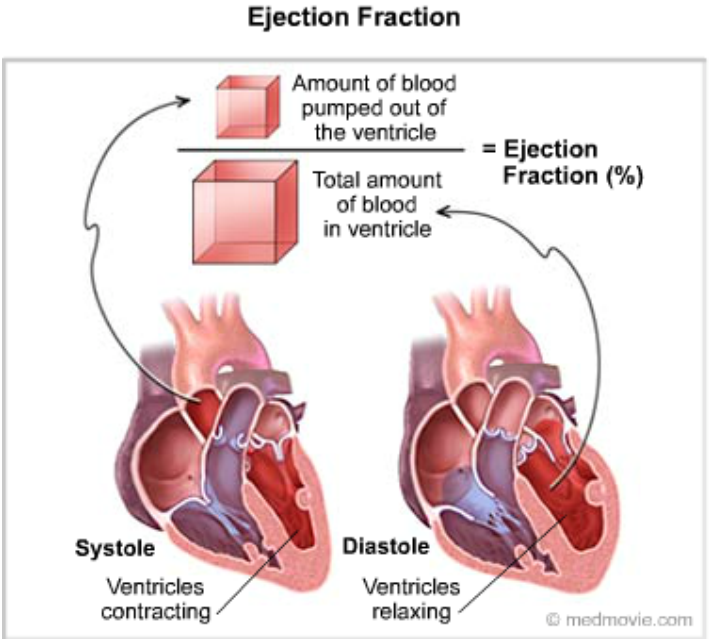


Fig: 7 Ejection Fraction

c. Quality of Life:

Charoenkul[126] studied the effectiveness of cardiac treatment process in Coronary Artery Bypass Surgery (CABG) subjects on health related quality of life at Thailand in 2007. Among 34 subjects, aged 50-75 years were involved in the study. Subjects who were involved randomly separated by age and gender corresponding to experiment and control groups. The experiment group obtained 45 days of a home based CR process including a half an hour walking which was improved by 5 minutes or 100 meters every 7days. Both experiment and control groups were called weekly 3 times to motivate the intervention group to do the cardiac rehabilitation process at home and to enquire the control group regarding their physical state .Quality of life was compared two times by the SF-36 questionnaire at the sixth day and six weeks after surgery. The conclusions showed that following 45 days home process cardiac rehabilitation, the study group had

significant increase in their physical activity tolerance (3.24 18.70 vs 15.00 18.54, p=0.038), physical role limitation (-1.47 46.33 vs 41.18 37.44, p=0.003), general health (3.82 10.61 vs 23.65 26.61, p=0.005), vitality (10.59 24.42 vs 29.12 17.87, p=0.009), social functioning (7.35 27.97 vs 22.06 17.98, p=0.039), and reported health transition (0.18 1.01 vs -0.94 0.97, p=0.007). There were no marked changes amongboth the groups in the percentage of the pain (-3.00 30.50 vs 14.94 36.95, p=0.066), emotional role-limitation (3.92 56.37 vs 21.57 35.24, p=0.141), and mental health (12.94 24.02 vs 22.82 16.05, p=0.084). 45 days of home process CR increased the quality of life in post-CABG patients.

Leila Lavorata etal[127] have done a study to assess the benefits of Cardiac Rehabilitation Process (CRP) at Canada during 1999-2001. The goal of the study was to measure physical condition related QOL outcome measures before and after participation in the CRP.A total of 64 Participants were put into five CRP groups. Participants finished the short form 36 health survey of a 13 week CRP intervention. The sf 36 analysis showed significant difference in previous and after scores of six of the eight categories. Greater effect sizes were obtained for physical functioning (d=0.746), Role physical (d=657), and vitality (d=0.593). Lesser effects were obtained for Bodily pain (d=0.299), Social functioning (d=0.337), and Role Emotional (d=0.271'). The findings of this study emphasized better health-related quality of life outcome for subjects receiving complete cardiac rehabilitation programs.

Jegar et al[128] performed a Cohort study to assess the result of outpatient cardiac rehabilitation in significant patient sub groups(women ,elderly men ,diabetic patients and ethinic minorities) from March 1999 to August 2003 in Switzerland' on

1061 patients including 155 (15%) women and 87 (8%) men aged ≥ 75 years, 162 (15%) who suffered from diabetes mellitus and 88 (8%).They were not spoken the regional language .Causes for outpatient CR identified were acute coronary artery disease (87%), valvular heart disease (9%) and congestive heart failure (1%). Average age was 62 years (standard deviation 11). Subjects showed increase of their age related physical tolerance ($p < 0.0001$) and quality of life ($p < 0.0001$) during the process. While the early physical activity load obtained was lesser than normal for subjects ($p < 0.0001$), it improved in all categories of subjects during outpatient CR ($p < 0.0001$). Fundamental quality of life was lesser in females whereas improved in many categories for every categories of subjects evaluated. The study concluded that' the significant categories of subjects such as females, old males, diabetic patients and racial subgroups, were of limited concern in outpatient cardiac rehabilitation. Due to lesser fundamental quality of life, women required unique medical interest earlier to outpatient cardiac rehabilitation'.

A systematic review was conducted by Balraj etal[129] in the University of Warwick, Melbourne, Australia to find out the efficiency of physical activity based cardiac rehabilitation (exercise education singularly or in mixture with psychosocial or educational intervention on death), associated with disease and health related quality of life of patients with CHD. They used MEDLINK, EMBASE, CINAHL and science related citation expand from 1999 to Dec 2009. The patients studied were in all ages who had MI, CABG, PTCA and who had angina pectoris or coronary artery disease distinct by angiography. Systematic review allowed randomizing 10,794 subjects to physical activity based cardiac rehabilitation or routine treatment. In medium to longer term (one year or more months follow up) exercise based

rehabilitation decreased on the whole and cardio vascular death (RR 0.87 (95% CI 0.75, 0.99) and 0.74 (95% CI 0.63, 0.87) correspondingly and hospital admissions (RR 0.69 (95% CI 0.51, 0.93) in short -term (<12 months follow up) with facts of heterogenicity in result process and method of treatment result. Meth analysis was not considered for health related QOL. " Out of 10 trial seven treatment health related QOL using analytical measures, there was proof marked greater level of QOL with physical activity based cardiac rehabilitation than routine treatment. The author concluded that physical activity based cardiac rehabilitation is efficient in decreasing total and cardio vascular death (in medium to long term studies) and readmissions (in short term studies) but not whole MI or revascularization (CABG or PTCA). In spite of increase in new studies, the subjects calculated for this study reconsidered were still mainly mid-age males with lesser risk.

So, well defined and sufficiently analysed RCTs in groups of CHD subjects a greater involvement of routine clinical practice is required. These attempts must involve calculated health related quality of life result steps and needs to openly account events in the clinic with inpatient admissions. The conclusion of this experiment point out that physical activity based rehabilitation decreases the incidence of death due to heart disorders and there is an average support of progress in QOL in the majority of adult male subjects incorporated in the above experiments. They concluded that further analysis was required to evaluate the whole purpose of physical activity based rehabilitation in a larger group of subjects.

Tendari etal[130] evaluated impacts of progressive muscular relaxation coaching on Quality of Life in anxious subjects later to CABG surgery in Iran (2007). An open uncontrolled trial sample involving 110 subjects of the Cardiac Rehabilitation

Centre, 6 weeks after CABG surgery - , 2007 in the age group of 40-65 yrs with moderate to severe anxiety score > 80 of the state trait anxiety were included. QOL was measured by Short form 36 instrument. Patients were given life style education and relaxation therapy. Duration of relaxation therapy was 6 weeks and usual care was given for 8 weeks Two groups were continuously followed for one month subsequent to ending of therapy. Following this, the anxiety and quality of life in both intervention groups were evaluated. Analysis showed that there was no major difference in overall QOL, state anxiety and trait anxiety scores among both groups before therapy. Major reduction in state and strait anxiety $P < 0.01$ were noted in relaxation group followed by the therapy in relation to control group. Females had high anxiety score and a lesser quality of life than in male, in both groups prior to intervention. After the intervention, no discrepancy was found among men and women in relaxation group. The results concluded that "progressive muscular relaxation coaching was an efficient intervention for enhancing mental well being and quality of life in anxious heart patients.

Skep etal[131] analyzed in 2000-2012 at Songkla University, Thailand, with the purpose of identifying interventions that enhance CR in myocardial infarction patients. A search was conducted in the electronic data bases CINAHL, pubmed, science direct, Cochrane library and pro quest.' To enhance cardiac rehabilitation behaviour, interventions were conducted in various settings and locations included in the OPD, cardiac rehabilitation center, home based and combination of hospital based and home based CR'. Education was given individually by the rehabilitation team of medical director, nurse educator and with each topic in separate session. The duration of intervention was less than 6 months

(short period), 3 months to 12 weeks (Medium) and 12 months – 48 weeks (long term). Results showed that there were 10 experimental studies and 2 meta analysis studies. Interventions were widely used to enhance cardiac rehabilitation behaviours in MI patients and were self efficacy and self management derived programs. The programs write involved intervention that enhances cardiac rehabilitation behaviours, including training exercises, behavioural changes, education and psychological support and life style changing strategies. Four phases were followed specifically in hospital care, before post discharge period, exercise education and chronic follow up. The study concluded that cardiac rehabilitation program leads to enhance quality of life and decrease mortality in MI patient. Health care stressed that the development of culturally specific interventions to increase cardiac rehabilitation behaviours words lead to significant improvement in cardiac patients health outcomes.

A retrospective observation study was done by Lindsay et al[132]. on a random sample of 209 subjects who underwent optional first time CABG in UK during 1998 to 2003 . Pre and post operatively those subjects were followed for four weeks. In order to relate presence of next symptoms of CABG such as cardiac signs of illness, general health status and existence of adaptable CAD riskfactros , Sf 36 questionnaire was used to assess the general health status. Seriousness of cardiac signs of illness was evaluated by a visual analogue scale modifiable to coronary artery disease risk factors (smoking, body mass index, hypertension and increased fat) and absence of social involvement. There were ten earlier and three later deaths .Of them 13 subjects withdrew from diagnosis. Therefore, 183 were entirely calculated. 65 of them finished CR programme. 10.4% partly finished (less than half the time) and were disqualified from the calculation. Subjects who did not attend

probably were people who smoke(P=0.002) and diabetics (P=0.028) they were and were largely withdrawn from society. But the amount of patient with BMI>25, BP>140/90 or cholesterol >5.0mmol were the same. There was no difference in age in the pre operative New york Heart Association score, which choose the No. of graft chest pain reoccurrence (46% vs 38%, P=0.35) or breathlessness (62 Vs 69%, P=0.40) between attenders and non attenders. The seriousness of chestpain (2.7 Vs 3.2, P=0.286) and breathlessness (3.5 vs 3.6 P=0.79) was the same. However, hours of eight health domains calculated and showed markedly improved values for participants than non participants in the CR programme. They are General Health (60vs 46%, P=0.001) physical function (64 vs 55% P=0.001), role limitation (48 vs 29%, P=0.02) and social function (74 vs 63%, P=0.64). The study concluded that higher general health scores were associated with participants.

d. Life Style Modifications:

A double blind peer reviewed study conducted in 2012 in UK by Edmund[133] for improving the well being with cardiac rehabilitation. There was clear evidence that cardiac rehabilitation improved the health of patients with CVDand only 50% of patients were accessed in these programmes. She opined that cardiac rehabilitation improved the health and well being of patients with cardiovascular disease. Programmes should be tailored to individual needs and enable patients to set achievable goals. Successful cardiac rehabilitation requires multi-agency and multi professional collaboration to identify and refer patients. Services should be delivered by and competent, skilled practitioners. Audit and evaluation are crucial to ensure patients who receive evidence based care. Study concluded that cardiac rehabilitation is often considered in terms of its components of exercise, education

and stress management. A combination of these as part of an integrated service, delivered by skilled and competent practitioners has an evidence base. These services should be accessible to all patients'.

A study was done by Naikjay & Roosha[134] in Ahmedabad, India (2010) to "identify the importance of nutrition in addition to inclusion of exercises in usual life style to avoid along with care for cardiovascular disease, in turn decreasing the cardiac threat factor increasing aerobic ability and helping the subjects general quality life. The study concluded and suggested following recommendations for nurses to incorporate in CRP.

1. Nutrition and cardiac treatment process as have a greater importance in the treatment process of heart patients.
2. Macronutrients collected from whole grain (whole wheat and oats/oatmeal), fruits (apple, orange, pineapple, cranberry, cherry and peach), vegetables (carrot, parsely, beetroot, cabbage, spinach and tomato) and less cholesterol dairy products decrease hypertension, LDL-cholesterol, and triglyceride levels.
3. Micronutrients involving (C, B6 and B12) and minerals (potassium, magnesium, and calcium) gained from intake decrease blood pressure.
4. In every day dietary plan, replace solid fats with liquid vegetable oils.
5. Prefer and organize foods with slight or without salt.
6. Physical movement and physical activity direct to raise in cardiac contractility, stroke volume and peripheral vascular tone, increased plasma volume and lessening hypertension.

7. Expand a record of personalized physical activity instruction for aerobics include: Frequency: 3-5 days per week for 4-6 weeks; Intensity: 60% to 70% of the maximal heart rate; Duration: 30 to 60 minutes; and Mode: Walking, treadmill, cycling, and others. Involve 10 minutes of physical activity such as calisthenics, stretching and walking as warm-up period and 5 minutes of cool down period in each aerobic education program to preserve health.

Satyajit & Jaya Singhe[135] 'reviewed the effectiveness of yoga in the primary and secondary preventive measure in ischemic heart disease and after heart attack patient rehabilitation in Israel medical centre, Newyork.. "Yoga is an alternative structure of physical activity which is being carried out for a chronic peroid in India. It has obtained large regard in the form of leisure activity everywhere on earth. Its achievable help to healthy living has been understood and more intriguing findings have been made. Profits of yoga in the change of cardiovascular risk factors and in the rehabilitation after heart attack are areas of marked significance. It is vital to evaluate the importance and including yoga into the whole cardiac rehabilitation programme".

Another randomized trial done by Berger in Germany[13 6] is an individualized yoga programme which can help in reducing blood pressure on top of best medical treatment (2010). Yoga has been proved to reduce blood pressure. Yoga was given for 30mts for five days in three weeks among 340 male cardiac rehabilitation patients who were among hypertension next to primary cardiac occurrence They were assigned to measure severe cardiac rehabilitation process that consisted also PMRT or viniyoga more than a three weeks time . At the end of 3weeks of inpatient

education ,systolic blood pressure in men in yoga group reduced to 8mmhg as evaluated with 6mmhg in PMRT group . The study concluded that yoga program is beneficial into people with higher baseline blood pressure.

Kocur etal[137] in Polska," identified the importance of walking in cardiac rehabilitation (2012). Rehabilitation is based on physical exercise and it should focus not only improving current level of fitness but also an increasing awareness and forming a habit of physical activity as a form of secondary cardio vascular prevention. The purpose of this learning is to reconsider the most current publications resting on the subject and point to the importance to successful rehabilitation even for cardiac surgery patients. The study postulated that walking in simple forms is a physical activity and is an essential factor for reducing the occurrence and recurrence of cardio vascular disease. Walking at a pace of 3-6km/h raises the energy expenditure and 20-30mt/km 4-5 times a week is a safe method. The study indicated that walking is a very effective tool in cardiac rehabilitation. It increases comfort for the patient after cardiac surgery and is simply irreplaceable as a preventive measure.

A systemic review was conducted at Vancouver[138], Canada by Jackson etal to 'identify reference & adherence prediction in CR'. A literature search was performed using (psyclnfo, medline, web info, pubmed) between 1990-2004 in which only 60 participants were included. Only 20% of them were female. This result was published in 32 articles in data covering 16804 patients, 5882 of whom were women". Patients actively participated in CR programme. The processes were made simply available to them. Those who had to travel long distance to participate in CR programme and those who had family obligations experienced guilt for their inability to participate. Women were less involved even after appointment. In

conclusion, most of the practical indicators as well as those particular related to women potentially changeable with health practitioners.

A prospective review conducted by Cooper[139] at St.Thomas Medical School, London at (1999),' identified socio demographic profile or clinical predictors of non attendance. The review intended to identify sickness beliefs said during hospitalization of the subjects who had astute heart attack or those who underwent coronary artery bypass graft surgery can forecast the need for cardiac rehabilitation attendance .Out of 152 patients prospectively studied 41% had 6 months cardiac rehabilitation. Results showed, because of old age and low awareness of their lipid levels, non participants chances to believe that they are in a controllable condition their life style may have attributed to their sickness. The study concluded that treatment meant at maximizing some views could help cardiac rehabilitation uptake amongst those subjects who could promote the maximum.

Dr.Rajendran etal[140], from Apollo Hospital, Chennai, "evaluated the effectiveness cardiac rehabilitation program in CABG surgery patients. The review was approved in an hospital setup including 74 subjects who underwent Coronary Artery Bypass Surgery (CABG). The subjects were assessed before surgery and were introduced into lifestyle modification based on Diet, Relaxation, Exercise, Attitude and Motivation (DREAM) idea on discharge. The subjects were educated on walking exercise based on target heart rate of 60 – 75% according to age. The followup was done every 2weeks. The results of functional capablity was evaluated by treadmill test for 90 days postoperatively, cholesterol and blood sugar profiles and anthropometric index viz. Body Mass Index (BMI) and Waist to Hip Ratio (WHR). The methods were evaluated for pre- and 3 months post- operatively. Results

showed that there was a preferable alteration in functional capablity (11.4 + 1.59 METS), resting rate pressure (P=0.000), fasting blood sugar (P=0.003), total cholesterol (P=0.007), triglycerides and HDL ration (P=0.007 & P=0.003) anthropometric indices. The results suggested an advising model for successful cardiac rehabilitation programme. It is also one of the useful secondary preventive measures of Coronary Artery Disease in India.

5. LITERATURE & STUDIES RELATED TO NURSE'S ROLE IN CARDIAC REHABILITATION

Jiang, etal[141] conducted 'a randomized controlled trial at Chengdu, China with the purpose of examinins the result of a cardiac rehabilitation programme on health behaviours and physiological risk parameters in patients with cardiac disease'. The research design involved randomized assignment of subjects of coronary heart disease patients (n = 167)." Throughout the study,4 patients in the study group and 12 patients in the control group withdrew in 90 days; 10 (5 in the intervention group and 5 in the control group) with drew in 180 days. Mann-Whitney U-test, t-test or chi-square test according to the categories of variables and the normality test of the data were used to test the discrepancies between control and intervention groups. The CR programme of this study was a 3 months inpatient initiated home based comprehensive cardiac rehabilitation process which intended for helping self reliance for improving and secondary prevention during the discharge process. Outcome of cardiac rehab programme noted intervention group with significant physiological risk parameters (lipids, BP, body weight), walking performance (39.47), step II diet compliance (P<0.05) and medication compliance. This study analysed a distinctive way for nurses to meet the rehabilitative care needs of CHD patients by refining,

encouraging , supervise and reinsisting their everyday self- treatment process. The discharge programme also formed a model for connecting the acute care and community rehabilitative care. It was additionally accepted and prolonged to the midway care and home care of other longterm subjects.

Zhaoy etal[142] throughr andomized controlled trial reviewed the efficiency of a post discharge changeover programme amongst subjects with coronary heart disease in 2009. The analysis involved 200 patients, The control group (n=100) received usual treatment and the intervention group (n=100) got post discharge intermediary care program, which lasted of pre discharge evaluation, follow up home visits and telephone follow-ups within four weeks after discharge. There were notable changes among the control and intervention groups in dietary management and healthy changes in lifestyle on day 2 and weeks 4 and 12, in medication at weeks 4 and 12 and exercise at week 12. The results of this study displayed improvement of the program by showing that such programmes help subjects to stick to a healthy lifestyle and hence control the factors leading to the disease. The behavioural and practical effect of a therapeutic lifestyle-change for heart disease risk factors in subjects later to CABG was also analysed by Lin et al[141].participated in their study 73 patients. Steps of behavioural and practical implications were compared before surgery and after 3 months of discharge. The conclusions showed that the amplitude of cigarette smoking, blood pressure control, frequency of exercise and dietary practices were changed in both groups in the first month. Three months after discharge, blood pressure control and frequency of exercise in the experimental group were prominently more than the control group. In conclusion, the therapeutic lifestyle change intervention into a rehabilitation program significantly alters heart disease risk

factors and may increase post operative well being and prognosis. The conclusion also shows that with assistance nursing personnel in the cardiac rehabilitation patients can get better health outcomes and decrease the risk of a new cardiac occasion. It is of most significance for nurses to meet the rehabilitative care requirements of patients through education, care, management and support.

Conclusion:

Cardiac rehabilitation programmes are planned to help the outcome of acute management plans and to avoid factors of risk, which are important for an amendment in the patient's well being and improvement. However, all the cardiac rehabilitation programmes do not occur in the same instant, and so the nurse's play important in quality as time passes. The purpose of the review is," to stress the importance of the nurse in cardiac rehabilitation programmes. The nurse's various roles parts of play in cardiac rehabilitation have a 'spider in the web-like' attribute and, based on the stage of the subject's improvement, he/she acts as a container, a counsellor, a trainer and a teacher. To carry out a good cardiac rehabilitation, the nurse must have planned examination tools in practical relevance as well as to be self-At the outset critical and serve as a better role model. Finally, the cardiac rehabilitation nurse must have a four-fold comprehensive view of the cardiac rehabilitation concept; an impact perspective, a timing perception, an advanced outlook and a personal viewpoint

CHAPTER - III

RESEARCH METHODOLOGY

Research methodology is the method followed systematically to solve the research problem. It is concerned with defining problem, formulation of hypotheses, methods which are adopted for data collection and statistical techniques used for analyzing the data with the logic behind it.[79]

This chapter describes the steps that are generally adopted by a researcher in studying the research problem. It includes the research approach, design, population, sample and sampling technique, development of the tools, pilot study and procedure for collection of data and data analysis method.

3.1 RESEARCH APPROACH:

Research approach denotes basic procedure for conducting the research. The choice of the research approach depends upon the purpose of the study. Quantitative approach focuses on the effectiveness of cardiac rehabilitation programme on activity tolerance, selected physiological parameters (heart rate, ECG) and quality of life.

The present study mainly aims at assessing the effectiveness of cardiac rehabilitation program. Quantitative research approach is used for testing objective theories by examining relationship among variables. These variables in turn are measured, typically on instruments and so that the data can be analyze, using statistical procedures.

Fig.9 SCHEMATIC REPRESENTATION OF RESEARCH STUDY

Research statement:

A study to assess the effectiveness of cardiac rehabilitation programme on activity tolerance, selected physiological parameters (heart rate, ECG) and quality of life among hospitalized CABG surgery patients in government Rajaji hospital, Madurai .India

Research design: Quasi experimental non -equivalent Pre Intervention Post Intervention control group design

Setting ; Government Rajaji hospital , Tamilnadu India

Population

Target population

Patients who have diagnosed to have heart blocks under went CABG surgery

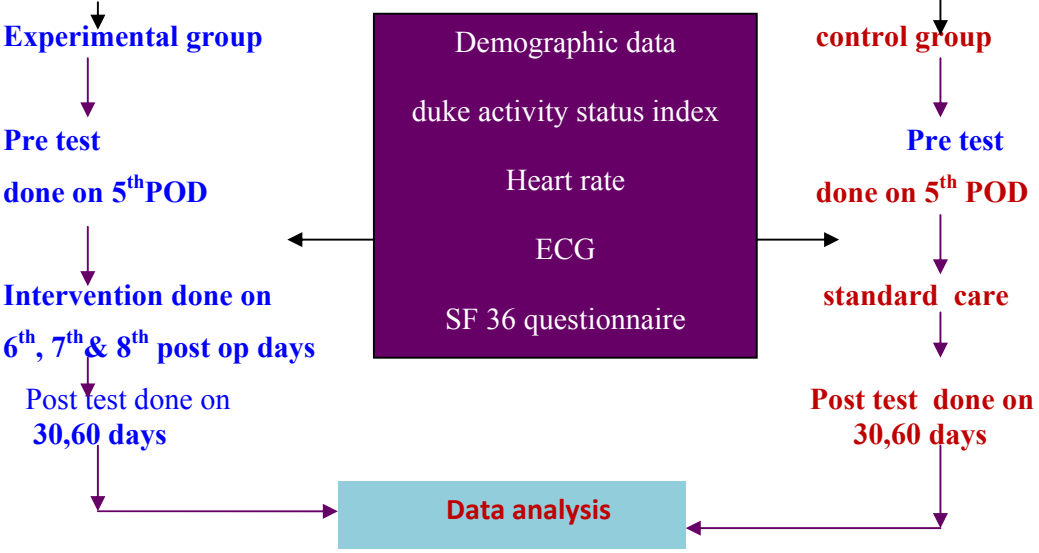
Accessible population

Patients under went CABG surgery in government Rajaji hospital during the period of data collection

Sample size -100

Sampling technique- Total enumerative sampling technique

Assigned to Experimental group n= 50 and control group n= 50



3.2 RESEARCH DESIGN:

Research design is the researcher's complete plan for obtaining answers to research questions for testing the hypotheses of the research.

Quasi experimental research design is used in the present study to determine the effectiveness of cardiac rehabilitation programme by adopting **quasi experimental non equivalent Pre test Post Test control group design.**

The study design which represents the population sample size, variables, data collection, tools, techniques and plan for data analysis.

The research methodology adopted for the study is diagrammatically shown in the following table.

Table No 3.1

Research Design

Group	Pre test Measurement on 5th Post operative day	Interventions 6th, 7th, 8th Post operative days	Post Test Measurement	
			30 days	60 days
Experimental Group	$A_1P_1Q_1$	X	$A_2P_2Q_2$	$A_3P_3Q_3$
Control Group	$A_4P_4Q_4$	standard care	$A_5P_5Q_5$	$A_6P_6Q_6$

Experimental Group:

A_1- Pre test assessment of, activity tolerance conducted on 5th postoperative day

P_1- Pre test assessment of physiological parameters (HR,ECG) conducted on 5th post operative day

Q_1 - Pre test assessment of Quality of life conducted on 5th postoperative day

A_2 - Post Test assessment of activity tolerance conducted on 30 days of cardiac rehabilitation programme

P_2- Post Test assessment of physiological parameters (HR, ECG) conducted on 30 days of cardiac rehabilitation programme

Q_2- Post Test assessment of quality of life conducted on 30 days of cardiac rehabilitation programme

A_3- Post Test assessment of activity tolerance conducted on 60 days of cardiac rehabilitation programme

P_3- Post Test assessment of physiological parameters (HR,ECG) conducted on 60 days of cardiac rehabilitation programme

Q_3- Post Test assessment of quality of life conducted on 60 days of cardiac rehabilitation programme

X -Intervention – Cardiac rehabilitation program

Interventions refer toPlanned teaching programme which includes

1. wound care
2. dietary management
3. adherence to medication
4. follow up and sexual relationship

Demonstration which includes -

1. stretching exercises which include upper back stretch, chest stretch lower back and waist mobility , calf stretch and hamstring stretch

- abdominal breathing and coughing technique
- use of incentive spirometry
- stress management techniques like progressive muscle relaxation
- suhasan
- counting pulse rate.

Control group:

A_4 -Pre test assessment of activity tolerance on 5th postoperative day

P_4 - Pre test assessment of physiological parameters (HR, ECG) on 5th post operative day.

Q_4 - Pre test assessment of quality of life on 5th postoperative day

A_5 - Post Test assessment of activity tolerance on 30 days

P_5 - Post Test assessment of physiological parameters (HR) On 30 days

Q_5 - Post Test assessment of quality of life on 30 days

A_6 - Post Test assessment of activity tolerance on 60 days.

P_6 - Post Test assessment of physiological parameters (HR, ECG) on 60 days.

Q_6 - Post Test assessment of quality of life on 60 days.

3.3 VARIABLES:

Variables related for the study are characteristics/properties of persons, things or situations that change or vary.

1. Independent Variable:

An independent variable a stimulus or activity which is manipulated or varied by the researcher to create an effect on the dependent variable.

In this present study cardiac rehabilitation programme is an independent variable. Interventions include planned teaching programme of - wound care, dietary management, adherence of medication, follow up and sexual relationship followed by (demonstration of physical exercise which includes stretching exercises, upper back

stretch, chest stretch, lower back & waist mobility, calf stretch, hamstring stretch, abdominal breathing and coughing technique, use of incentive spirometry, and stress management techniques like progressive muscle relaxation, suhasan and counting pulse rate)

2. Dependent Variable:

It is the outcome variable that is hypothesized to dependent on or because of the independent variable.

The dependent variables in this study are activity tolerance, physiological parameters, (HR, ECG) and quality of life.

3.4 SETTING OF THE STUDY:

The study has been conducted in Government Rajaji Hospital. This hospital has a bed strength of 2500 with various specialties and super specialties. The study has been conducted in cardio thoracic surgery post operative unit. The post operative unit is 20 bedded. Every week 2 CABG surgeries are performed among them many are males and few are females. They stay up to 12 days after surgery. Out patient department of cardio thoracic surgery is also used for study. Usually, in the post operative period after CABG surgery, common problems like wound infections neurological complications, arrhythmias and pulmonary complications develop after the surgery in CABG patients.

3.5 POPULATION:

The population is the entire group of persons or objects that is of interest to the investigator.

Target Population:

The target population for this study is patients diagnosed to have heart blocks in the coronary artery who underwent CABG surgery in Government Rajaji Hospital.

Accessible Population:

Accessible populations for this study is the patient who had undergone CABG surgery in Government Rajaji Hospital during the period of data collection who fulfill the inclusion and exclusion criteria.

3.6 SAMPLE:

The sample of the study is subset of the population selected by the investigator to participate in the research project.

The patients in Government Rajaji Hospital who have undergone CABG surgery and those who have fulfilled the inclusion criteria during the data collection period between 1.6.13 to 1.4.14 were are selected for the study .During the period of data collection one of the subjects had neurological problem and one of the subject transferred to Thoracic Department.

3.7 SAMPLE SIZE

As per the pilot study conducted, the percentage of improvement in the intervention group is 70%

Control group 42%,

Mean difference 28%,

The power 80%

Alpha error 5% with two sided

Minimum required sample size 48 in each group. The following formula has been used to estimate the sample size

$$n = \frac{\left\{ Z_{1-\frac{\alpha}{2}} \sqrt{2\,\bar{P}\,(1-\bar{P})} + Z_{1-\beta} \sqrt{P_1\,(1-P_1) + P_2(1-P_2)} \right\}^2}{(P_1 - P_2)^2}$$

Where,

$$\bar{P} = \frac{P_1 + P_2}{2}$$

P_1 : Proportion in the first group

P_2 : Proportion in the second group

α : Significance level

$1-\beta$: Power

A total of 100 patients with CABG surgery, 50 in experimental group and 50 in control group admitted in cardio thoracic surgery department were selected for the study.

3.8 SAMPLING TECHNIQUE:

Total enumerative sampling technique was used for the study. It is a variety of non-probability sampling technique In this sampling technique, the investigator picks all the subjects who are meeting the preset of inclusion and exclusion criteria . There is no possibility of contamination of samples. There is no chance of surgical patients again coming to cardiothoracic postoperative department. So initially 50 samples were taken for experimental group and followed by 50 samples were taken for control group.

Inclusion Criteria:

- Male & female patients who had undergone CABG surgery.
- Patients who were in the hospital on 5^{th} post operative day after CABG surgery.
- Patients who are able to speak
- Patients aged between 35-75 were included
- Patients who were willing to participate.
- Patients who had CABG surgery with either single vessel/ double vessel / triple vessel disease and had undergone CABG surgery.

Exclusion Criteria:

- Patients who had neurological complications and were unconscious.
- Patients who had renal complications
- Patients who were unconscious.
- Patients with cardiac problems or arrhythmia

3.10 DESCRIPTION OF THE TOOL

In this present study, the following tools are used by the researcher based on the objectives of the study.

Part I: Demographic & clinical variables

Part II: Duke Activity Status Index

Part III: Heart rate

Part IV: ECG

Part V; ECHO

Part VI: Sf 36 questionnaire.

Part I:

It consists of Demographic variables such as Age, Sex, Religion, Educational status and Food habits.

Clinical variables that involve number of vessels blocked, presence of co morbid condition, presence of unhealthy habits ,Blood pressure and Heart rate. It is filled by the researcher according to the condition of the patients.

Part II: Duke Activity Status Index

Structured interview scale for activity tolerance was developed .Most of the items were taken from duke activity status index. It is a standardized tool developed by Hlatky et al ,Duke University, North carolina. It measures the functional capacity thereby it measures the activity tolerance. It has been practiced to monitor progress in patients with coronary artery disease. It is a valid measure that can be obtained by self administered questionnaire. A 12 item scale is correlated well with a patient's Peak oxygen uptake. It can be used to assess the effect of medical treatment and cardiac rehabilitation. Duke activity status index according to original scale chronbach's alpha method is 0.93 [143]

The index has been measured with yes or no questions. The investigator rated the components by placing a √ mark against the respective column of each item, as per respondents response. The items include, personal care, ambulation, house hold tasks, sexual function and recreation with respective metabolic costs.

In this study the questions have been asked to each subjects by interview method. The data were collected on 5th, 30 and 60 days.

Scoring and Interpretation:

It has 12 items. The responses of the subjects are entered under Yes or No. Higher Metabolic equivalent test scores indicate higher activity tolerance. Metabolic equivalent test is determined by duke activity status index given below:

Table No 3.2

Scoring of Duke Activity Status Index

It has a 12 questions. It estimates peak oxygen uptake. Each item has Yes or No.

ITEM	YES	NO
1	2.75	0
2	1. 75	0
3	2.75	0
4	5.50	0
5	8.00	0
6	2.70	0
7	3.50	0
8	8.00	0
9	4.50	0
10	5.25	0
11	6.00	0
12	7.50	0

Interpretation

Duke Activity Status Index = Sum values of all questions

Maximum value - 58.2

Minimum value - 0

Estimated peak oxygen uptake in ml/mt

=0.43*(duke activity status index) +9.6

Functional capacity can be expressed in Metabolic Equivalent Test levels. The Oxygen consumption can be expressed in MET levels. The oxygen consumption (vo2) in a resting state is equivalent to 1 MET.

Table No 3.3

Relationship between functional capacity and Oxygen consumption according to the Age

WOMEN						
AGE	**LOW**	**FAIR**	**AVERAGE**	**GOOD**	**HIGH**	**ATHELETIC**
20-29	<28	29-34	35-43	44-48	49-53	54-59
30-39	<27	28-33	34-41	42-47	48-52	53-58
40-49	<25	26-31	32-40	41-45	46-50	51-56
50above	<21	22-28	29-36	37-41	42-45	46-49
MEN						
20-29	<38	39-43	44-51	52-56	57-62	63-69
30-39	<34	35-39	40-47	48-51	52-57	58-64
40-49	<30	31-35	36-43	44-47	48-53	54-60
50-59	<25	26-31	32-39	40-43	44-48	49-55
60above	<21	22-26	27-35	36-39	40-44	45-49

Part III: Heart Rate

Heart rate, is measured by stethoscope in the site of 5th intercostals space by the researcher . In this study heart rate is checked on 5th day,30 days and 60 days.

Part IV: Electrocardiogram

The electrical activity of the heart was assessed by electrocardiogram. The basic P,QRS, and T wave forms were captured and recorded in ECG machine to

assess the cardiac function. The tracings were viewed on the screen of an oscilloscope. Deviations from normal sinus rhythm indicated abnormalities in heart function. According to the physicians interpretation, the investigator has recorded the ST Depression scores (V5-V6 Leads) in mm and this ST Depression in mm is measured as follows. In this study, post operatively on 5th day and on 60 days are monitored.

Scoring & Interpretation of ECG ST Depression scores:

3 – 4mm	-	Severely ischemic
2 – 3mm	-	Moderately ischemic
1 – 2mm	-	Mild ischemic
Below 1mm	-	Normal

Part V: Echo Cardiogram

Echo cardiogram is an ultrasound of the heart. Echo has various dimensions. In Echo cardio graphy ,high frequency sound waves bounce off cardiac structures to provide information about size ,shape, and position of the heart ,the thickness of the walls of the heart, and the function of heart valves ,atria and ventricles . One of the aspect is Ejection Fraction. It was monitored in the study.

Echo - Ejection Fraction Scores

In this study, Ejection Fraction Scores of postoperatively on 7th day and after surgery(3 months) are noted. Ejection fraction score is the percentage of the end diastolic volume that is ejected with each stroke. Based on the suggestions given by cardiothoracic surgeons, the ejection fraction scores in the current study are interpreted as below:

Above 50	-	Normal
40 – 49	-	Mild left ventricular dysfunction
30 – 39	-	Moderate left ventricular dysfunction
Below 30	-	Worst left ventricular dysfunction

Part VI: Short form 36 questionnaire

- It is a standardized tool. This standardized questionnaire has been constructed and developed by John. E.Ware et al (2000). It measures the quality of life. It is an 8 scale profile of functional health and well being score as well as psychometrically assessed physical mental health measure and a preference based health utility index[144] . Reliability of the tools according to the original scale
- Physical functioning-.93
- Role Physical - .89 ,
- Role Emotional - .82
- Bodily Pain - .90 ,
- General Health - .81 ,
- Vitality - .86,
- social Functioning - .68
- Mental Health - .84

By test, re test method physical component score reliability was .92 and mental component reliability was .91

A tool comprises 36 items self report scales in a 5 point Likert scale. These cover the ability to function and complete daily activities including physical and social activity.

The subjects were asked the questions and positive or negative answers were marked in the appropriate column.

In this study, the questions were asked to each subject by interview method .Data were collected from 5th day,30 days and 60 days.

Description of Tool:

The SF 36 health questionnaire is a generic outcome measure designed to examine a person's perceived health status. It is a self report questionnaire. It is a multi systems scale testing the quality of life.

The SF 36 is a generic multidimensional instrument consisting of eight multi item components representing the following eight concepts.

1. Physical functioning, i.e., the extent to which health limits physical activities such as self care, walking, climbing stairs
2. Role functioning physical i.e., the extent to which physical health activities interfere with work or other daily activities.
3. Bodily pain i.e., the intensity of pain and that effect of pain on normal work, both inside and outside home
4. General health perceptions i.e., GH', personal evaluations of current health, health outlook, and resistance to illness
5. Energy and fatigue i.e., VT' feeling full of energy rather than tired and work out
6. Social functioning i.e., the extent to which physical health or emotional problems interfere with normal activities
7. Role functioning emotional i.e., the extent to which emotional problems interfere with work or daily activities

8. Emotional well being i.e., general mental health including depression, anxiety, behavioral emotional control and general positive effect
9. Physical component summary includes physical functioning, role physical, body pain and general health. Mental component summary includes energy & fatigue, social functioning, role emotional and mental health.

Table No 3.4

Scoring and Interpretation: Short form 36 questionnaire

STEP:1 SCORING QUESTIONS

Question number	Original response	Recorded value
1,2,20,22,34,36	1	100
	2	75
	3	50
	4	25
	5	0
3,4,5,6,7,8,9,10,11,12	1	0
	2	50
	3	100
13,14,15,16,17,18,19	1	0
	2	100
21,23,26,27,30	1	100
	2	80
	3	60
	4	40
	5	20

	6	0
24,25,28,29,31	1	0
	2	20
	3	40
	4	60
	5	80
	6	100
32,33,35	1	O
	2	25
	3	50
	4	75
	5	100

Table No 3.5

AVERAGING ITEMS TO FORM SCALES

STEP:2 AVERAGING ITEMS TO FORM SCALES

Scale	No. of items	Recording of average
physical functioning	10	3,4,5,6,7,8,9,10,11,12
Role limitation physical health	4	13,14, , 15,16
Role limitation emotional	3	17,18,19
Energy and fatigue	4	23,27,29,31
Emotional well being	5	24,25,26,28,30
Social functioning	2	20,32
Pain	2	21,22
General health	5	1,33,34,36

STEP:3 FIGURING SCORES

All questions are scored on a scale from 0 to 100 with100 representing the highest level of functioning possible .Total scores are compiled as a percentage of the total points possible by Step 1 chart.

The results from those questions that address each specific area of functional health status (step 11 chart), are then averaged together for final score within each of the dimensions measured. Total score of 100 represents high energy and lower score of 46.7 % suggests a loss of energy.

Planned Teaching Programme

Aim

To impart adequate knowledge to the post CABG surgery patients on cardiac rehabilitation and developing a positive attitude to perform cardiac rehabilitation at homecare set up.

Objectives

1. To identify risk factors and mitigate them so as to adopt a healthy lifestyle
2. To understand the importance of medication and maintain adherence
3. To achieve blood sugar, serum lipid and blood pressure control
4. To return normal to work and leisure activities.
5. To maintain regular follow up
6. To minimize the risk of a heart attack

Planned Teaching programme and demonstration are related to cardiac rehabilitation programme. It consists of teaching programme about disease condition,

care of the wound, stress management, follow up care and dietary management and demonstration includes abdominal breathing, coughing, use of incentive spirometry, stress management technique and exercise therapy.

The areas covered are as follows:

Planned teaching programme includes

- Teaching about disease condition – Teaching about reason for vessel block and the CABG procedure undergone.
- Special care after CABG surgery (care of wound) – Care of chest wound and leg wound
- Diabetes management – About diabetic diet .It helps to maintain blood sugar within limits. General dietary management – About low fat and low salt diet.
- It helps to keep blood pressure and cholesterol within limits.
- Sexual activity – How and when to return sexual activity
- Returning to normal job / occupation – about returning of normal work possibility and when to join occupation
- Follow up & medication – Teaching the side effects of medication and follow up.
- Smoking cessation – Explaining about ill effects of smoking and advise not to smoke further.

Demonstration includes

Aim

To Instruct adequate practice on cardiac rehabilitation exercises to the post CABG surgery patients and develop positive attitude towards exercise sessions and able to practice in homecare setup

Objectives

1. To tighten the abdominal muscles
2. To dislodge and loosen secretion
3. To eliminate tension and feel deep sense of breathing
4. To regulate process of inhaling and exhaling
5. To improve blood circulation
6. To reduce Physical and psychosocial stress
7. To improve self confidence.

- Abdominal breathing – Procedure of doing abdominal breathing .It helps to tighten the abdominal muscles and develop control over breathing.
- Coughing technique – Procedure of coughing technique with supporting on suturing site. Effective coughing helps to dislodge lung secretions and hence to prevent lung complications.
- Incentive spirometry – How to practice about incentive spirometry. It helps to improve pulmonary ventilation,counteract the effects of anaesthesia and helps to loosen the secretions.
- Stress management (progressive muscle relaxation) – Steps in doing progressive muscle relaxation and doing the procedure everyday is insisted .It helps to eliminate tension from the body and to feel deep sense of relaxation.
- Sukhasan – Demonstration of Sukhasan and reinsisting regular practice. It regulates the process of inhaling and exhaling. Continuous practice of this asana brings peace into the mind.
- Exercise therapy - demonstration includes - stretching exercises, upper back stretch, chest stretch, lower back & waist mobility, calf stretch, hamstring stretch and return demonstration by the patients.

The steps involved in the planned teaching programme are,

- Formulation of objectives
- Literature review
- Preparation of first draft of the teaching module
- Development of the criteria check list for validation
- Content validation of the planned teaching programme.
- Redefining the draft of the planned teaching programme.
- Finalizing the draft of .planned teaching programme.

The first draft of the teaching module has been developed after the retrieval of literature from different sources and consulting with experts. The content of the subject is made very simple, clear and comprehensive keeping in view of the learner's capacity to comprehend information.

Validity:

The content validity of the instrument has been evaluated by a panel of 11 experts and it is determined as follows,

- The standardized tools are used. The tools revalidated for their appropriateness by experts.
- The content validity of the instruments (part I, II, III, IV & V) is panel of checked by a 11 experts. It is refined & modified according to their recommendation & suggestions . .
- With regard to content validity of the planned teaching programme on, cardiac rehabilitation programme is given to the experts along with objectives of the study & evaluation criteria check list. The validated tools are received from the 11 judges in the field of nursing, medicine & biostatistics with their

valuable opinion. The suggestions are incorporated and a modification was done in the wordings of a few items The final draft of planned teaching programme is prepared.

Reliability

Scale used in this study is Duke activity status index for measuring activity tolerance with SF 36 questionnaire measuring quality of life and physiological parameters (HR, ECHO & ECG). Heart rate reliability is tested by inter rater reliability method. Duke activity status index, ECG, ECHO and Sf 36 questionnaire one tested by using cronbach alpha method. Translation reliability was done to english to tamil version r=. 9 was obtained.

In this study,

Quality of life by SF 36 questionnaire r=0.865 is obtained.

Activity tolerance by Duke activity status index r=0.865 is obtained.

Heart rate reliability r=0.9 was obtained by inter rated reliability method.

ECG reliability r=0.75 is obtained.

ECHO reliability r=0.75 is obtained.

3.10 PILOT STUDY:

Pilot study was conducted between the months of Feb and March. It was carried out in Government Rajaji Hospital. The samples were about 10 CABG patients. (i.e. 5 in experimental group and 5 in control group). After obtaining letter seeking permission from the heads of the institution to conduct the pilot study the schedule was prepared for data collection. A brief introduction about the study was given to the subjects followed by a detailed explanation given about cardiac rehabilitation programme Interventions which include Planned teaching of - wound

care, dietary management, adherence of medication, follow up and sexual relationship followed by demonstration of stretching exercises, upper back stretch, chest stretch, lower back & waist mobility, calf stretch, hamstring stretch, abdominal breathing and coughing technique, use of incentive spirometry, and stress management techniques like progressive muscle relaxation, suhasan and counting pulse rate. Pilot study finding revealed that, the descriptive statistics the mean scores of effectiveness of intervention proved as follows

1. Activity tolerance mean scores for pre, post 1 and post 2 - 16.77, 20.18 , 24.10

2. Quality of life mean scores as follows for pre , post 1 and post 2

Table: 3.6

PILOT STUDY REPORT

Quality of life	Pre	Post Test 1	Post Test 2
physical functioning	56.42	64.28	70.143
Role limitation physical health	27.14	35.71	46.42
Role limitation emotional	33.28	.42.41	56.85
Energy and fatigue	54.28	62.14	70.71
Emotional well being	57.71	62.57	70.28
Social functioning	62.28	67.57	71.28
Pain	34.71	37.8	43.14
General health	52.20	58.71	63.14

3.1 1 METHOD OF DATA COLLECTION:

Before starting the study, the researcher obtained formal permission to conduct the study from Sacred Heart Nursing College and Government Rajaji Hospital ethical committee. The data collection was conducted for one year. It was carried out from the 1st week of April 2013 to the last week of April 2014 till the eligible samples have been reached. The researcher obtained prior permission from the Government Rajaji Hospital, Madurai by explaining the importance of the study to the Head of the Cardio Thoracic Department. Data were collected from patients of cardiothoracic Department after 5th day of CABG surgery .In this study, patients who had CABG surgery during the period of data collection in Government rajaji hospital and who fulfilled the inclusion criteria were selected. The researcher introduced herself to each subject and explained the purpose of the study.Written consent was also obtained. Total enunerative sampling technique was used. Every week, 2 CABG surgery patients were followed up. Approximately, 8-10 patients in a month had this cardiac rehabilitation programme. Pre test was done in the postoperative ward of cardio thoracic department on 5th postoperative day for both experimental and control group.

On 6th postoperative day teaching was given about

1. Disease condition.
2. Care for surgical wound
3. How to take care the vein harvested area.

Flipchart was used for 6th day teaching

On 7th post operative day, demonstration of exercise therapy was individually done

demonstration of exercise therapy:

Upper back stretch and chest stretch,

Lower back & waist mobility,

Calf stretch and hamstring stretch],

Demonstration of following exercise

Use of incentive spirometry,

Abdominal breathing technique ,

Stress management technique like progressive muscle relaxation ,suhasan and counting pulse rate .

They were demonstrated and return they were demonstrated by the subjects. Flash card was used

On 8th postoperative day Planned teaching was given about

Dietary management,

Adherence of medication,

Follow up and sexual relationship.

As per the time schedule for each patient. Followed by this at last pamphlet was given. Exercise schedule for doing exercise therapy was also given. For control provided group, no intervention was given. Post evaluation was done to both experimental and control group by using the same tool in cardiothoracic outpatient department. The investigator thanked the subjects for their endurance and cooperation. The following figure depicts the activities of data collection in the experimental and control group.

The data collection was done separately in the experimental and control group, respectively. From Government Rajaji Hospital. The total data collection process was carried out in 4 sessions as follows. It includes the administration of Pre

test for Activity tolerance by duke activity status index, heart rate, ECG & Quality of life assessment by Sf 36 questionnaire for experimental and control group. The teaching programme was given to experimental group for 3 days in succession as follows.

SESSIONS:

Each patient was individually met by the researcher on the 5th post operative day and Pre test was done on the same day .the following sessions were conducted for each patient.

Session 1: Teaching Session:

It was done on 6th post operative day. The researcher introduced the cardiac rehabilitation programme to the subject and oriented each subject about disease condition the researcher anatomy and physiology of heart and pathophysiology about the disease condition and gave information about surgical procedure they have undergone with the help of flip chart and explained the care of the vein harvested area, sternal wound care and special care after CABG surgery.

Session 2: Demonstration Session

A demonstration was carried out individually for each subject on the 7th day. For abdominal breathing and coughing technique, incentive spirometry is used with the help of flash cards. Stress management technique (progressive muscle relaxation, suhasan and about how to count pulse rate was taught to each subject) with demonstratied by the researcher. In return, demonstrations were also simultaneously obtained by each subject. After a warm up phase, Exercise therapy was demonstrated by the researcher which included upper back stretch, chest stretch, lower back, waist

mobility, calf stretch and hamstring stretch. Cool down phase was maintained at last. Then exercise instructions were provided to each patient with the help of pamphlet and reinforcement of doing exercise daily according to the time schedule was provided by the researcher.

Session 3: Education on Life Style Modification Strategies:

It was done on 8th postoperative day .Individualized teaching was given about dietary management, sexual activity, returning to normal work, follow up and medication advice.

Session 4:

Each patient was followed by telephonic conversation every week and was advised to adhere exercise therapy. Doubts were cleared. Post Test was done for intervention group on 30 and 60 days.

Day 5	**Day 6 Interventions**	**Day 7 Interventions**	**Day 8 Interventions**	**30 days**	**60 days**
Pre test assessment for quality of life by sf 36 questionnaire, Activity tolerance by Duke activity status index, physiological parameters (HR, ECG	Teaching about disease condition by flip chart & wound care (special care & care of the vein harvested area	Demonstration of Abdominal breathing, coughing technique, use of incentive spirometry, stress management techniques like progressive muscle relaxation&	Dietary management, sexual activity, returning to normal work follow up medication & counting pulse rate	Follow up and Post Test On 30 and 60 days	Follow up and Post test on 30 and 60 days

,ECHO)		Suhasan & Demonstration of exercise therapy (includes upper back stretch, chest stretch, lower back & waist mobility, calf stretch, hamstring stretch) with return demonstration			
Duration: 1 hour	1 hour	1 hour	1 hr		

Table No 3.6

Overall Data collection process in Experimental & Control Group

Institution	Period	No. of Subjects	Activities
Government Rajaji Hospital, Madurai	May 2013	10	Day 5 – Pre test followed by intervention strategies done on 6,7,8 postoperative days .Post Test assessment was done on 30 and 60 days.
	June 2013	8	Day 5 – Pre test followed by intervention strategies done on 6,7,8 postoperative days Post Test assessment was done on 30 and 60 days.
	July 2013	8	Day 5 – Pre test followed by intervention strategies done on 6,7,8 postoperative days. Post Test assessment was done on 30 and 60 days.

	August 2013	8	Day5- Pre test followed by intervention strategies done on 6,7,8 postoperative day. Post Test assessment was done on 30 and 60 days.
	Sep. 2013	8	Day5-Pre test followed by intervention strategies done on 6,7,8 postoperative days and Post Test assessment was done on30 and 60 days.
	Oct. 2013	8	Day-5 Pretest followed by an intervention strategies done on 6,7,8 post operative days and Post Test assessment was done on 30 and 60 days.
	Nov 2013	8	Day-5 Pre test and standard care Post Test assessment was done on 30 and 60 days.
	Dec 2013	10	Day-5 Pre test and standard care Post Test assessment was done on 30 and 60 days.
	Jan 2014	8	Day-5 Pre test and standard care Post Test assessment was done on 30 and 60 days.
	Feb 2014	8	Day-5 Pre test and standard care Post Test assessment was done on 30 and 60 days.
	March 2014	8	Day-5 Pre test and standard care Post Test assessment was done on 30 and 60 days.
	April 2014	8	Day-5 Pre test and standard care Post Test assessment was done on 30 and 60 days.

Table No 3.7

Over All Plan Of Subjects Of Data Collection

Group	Period of Data Collection	Number of Subjects
Exprimental Group	May 2013 – Oct. 2013	50
Control Group	Nov. 2013 – Apr. 2014	50

For control group also, 5th day pre test data were collected in cardio thoracic department. Without cardiac rehabilitation follow up post test data I & II was collected in cardio thoracic outpatient department for control group on 30 and 60 days. Only pre test and Post test data were collected from control group after that 60 days of Post test instructions were given also for control group.

3.12 PLAN FOR DATA ANALYSIS:

The data were analyzed in terms of objectives of the study using descriptive & inferential statistics. The plan for data analysis is as follows:

- Organization of data in master sheet
- Demographic variables were analyzed in terms of frequency and percentage, Pre test & Post Test scores of activity tolerance, HR, ECG and quality of life scores analyzed in terms of mean and SD.
- Paired 't' test was used to find the difference in mean scores before & after cardiac rehabilitation programme both within experimental and control group.
- Repeated measure anova method was used to compare scores between experimental and control groups.
- Pearson correlation coefficient was used to find the correlation between activity tolerance, physiological parameters with quality of life.

3.13 ETHICAL CONSIDERATION: BENEFICIENCE / NON MALFICIENCE.

- Assurance was given to subjects that their involvement in the study will influence their outcome.
- Though the study is an experimental design, the intervention used was noninvasive.
- Based on ethical consideration, intervention was also given to control group at the and of data collection procedure.

Confidentiality:

Only self administered questionnaires were administered to protect the anonymity and privacy of the respondents contributing to the confidentiality of the responses.

Respect for Human Dignity:

Participants were advised about the voluntary nature of the study and given option to withdraw from the study at any stage.

- Participants were not required to identify themselves by name and have not been identified during data analysis or during discussion of the results and conclusions.
- Full explanation of the purpose of the research was given and the researcher was available to provide information and support as needed.
- They were informed about data collected from questionnaires and then stored in computed discs for final analysis which were shedded.

Justice:

- Research proposal was approved by the screening committee of the Tamilnadu Dr.M.G.R.Medical University, Chennai, TN.

- Ethical clearance was obtained from the ethical committee of the study centre.
- Prior permission was sought from higher authorities in concerned institution before commencing the study. Before the consent was sought by the researcher, gave all the details about the study to the respondents.
- Formal consent was obtained prior to completion of the data collection from the participants on the assurance of confidentiality.
- Conclusion

This chapter dealt with research design, sample, sampling technique, tools, method of data collection procedure, data collection plan, ethical consideration and plan for data analysis.

CHAPTER - IV

DATA ANALYSIS

This chapter deals with description of sample analysis, and analysis of data collected and achievement objectives of the study. Data were collected from 50 patients with CABG in experimental group & 50 patients with CABG in control group in Cardiothoracic Surgery ward of Government Rajaji Hospital in order to identify the effectiveness of cardiac rehabilitation programme on activity tolerance, physiological parameters (HR, ECG) & quality of life. The data collected are tabulated and presented under the following sections.

Section I:

This section deals with

1. Frequency and percentage distribution of CABG patients based on their demographic profile
2. Frequency and percentage distribution of CABG patients based on their clinical profile

Sect ion II:

The section deals with

3. Age wise distribution of activity tolerance of the male CABG patients of the experimental group in the pre test and post test I& II
4. Age wise distribution of activity tolerance of the male CABG patients of the control group in the pre test and post test I&II
5. Age wise distribution of activity tolerance of the female CABG patients of the experimental group in the pre test and post test I&II

6. Age wise distribution of activity tolerance of the female CABG patients of the control group in the pre and post test I&II
7. Assessment of physiological parameters (ECG ST depression) among CABG patients in experimental group vs control group in pre and post test
8. Assessment of physiological parameters(ECHO-EF scores) among CABG patients in experimental vs control group in pre and post test.

Section III

9. Comparison of activity tolerance scores of CABG patients in experimental group in the pre and post test I&II

10. Comparison of activity tolerance scores of CABG patients in control group in the pre and post test I&II

11. Comparison of activity tolerance scores of CABG patients between experimental vs control group in post test I&II

12. Comparison of physiological parameters (Heart Rate) scores of CABG patients in experimental group in the pre and post test I&II

13.Comparison of physiological parameters (Heart Rate) scores of CABG patients in control group in the pre and post test I&II

14.Comparison of physiological parameters (Heart Rate) scores of CABG patients between group experimental vs control group in post post test I&II

15 .Comparison of physiological parameters (ECG ST depression) scores of CABG patients in experimental group in the pre and post test.

16.Comparison of physiological parameters (ECG ST depression) scores of CABG patients in control group in the pre and post test.

17. Comparison of physiological parameters (ECG ST depression) scores of CABG patients between experimental vs control group in post test.

18. Comparison of physiological parameters Echo (ejection fraction) scores of CABG patients in experimental group in the pre and post test.

19. Comparison of physiological parameters Echo (ejection fraction) scores of CABG patients in control group in the pre and post test.

20. Comparison of physiological parameters Echo (ejection fraction) scores of CABG patients between experimental vs control group in post test.

21. Comparison of Quality of life scores of CABG patients in experimental group in the pre and post test I

22. Comparison of Quality of life scores of CABG patients in experimental group in the pre and post test II

23. Comparison of Quality of life scores of C ABG patients in control group in the pre and post test I

24. Comparison of Quality of life scores of CABG patients in control group in the pre and post test II

25. Comparison of Quality of life scores of the CABG patients between experimental vs control group in the post test I&II

2 6. Mean and SD of activity tolerance of experimental group patients by assessment

27. Mean and SD of activity tolerance level of control group CABG patients by assessment

28. 2X2 ANCOVA with last variable as repeated measure test result for the activity tolerance level of CABG patients after controlling with pre assessment level and educational status

29. Mean and SD of Heart rate of experimental group CABG patients by assessment.

30.Mean and SD of Heart rate of control group CABG patients by assessment

31.2X3 ANOVA repeated test result for the Heart rate of CABG patients

32. Mean and SD of Physical functioning of experimental group CABG patients by assessment

33. Mean and SD of Physical functioning for the control group patients by assessment

34 .2X2 ANCOVA with last variable as repeated measure test result for the physical functioning level of CABG patients after controlling with pre assessment level and educational status.

35. Mean and SD of Role limitation Physical function on daily activities of experimental group patients by assessment wise

36. Mean and SD of Role limitation Physical function on daily activities of control group patients by assessment.

37. 2X2 ANCOVA with last variable as repeated measure test result for the Role limitation physical function level of CABG patients after controlling with pre assessment level and educational status.

38.Mean and SD of Role limitation-Emotional function of experimental group patients by assessment.

39 . Mean and SD of Role limitation emotional function of control group patients by assessment .

40.2X2 ANCOVA with last variable as repeated measure test result for the Role limitation emotional function of CABG patients after controlling with pre assessment level and educational status

41. Mean and SD of vitality of experimental group patients by assessment.

42. Mean and SD of vitality of control group CABG patients by assessment.

Section 1V:

56. Correlation between activity tolerance and Quality of life scores of CABG patients in experimental group in the post test by Karl person correlation method.

57. Correlation between physiological parameters (HR) scores and Quality of life scores of CABG patients in experimental group in the pos test by Karl person correlation method.

58. Correlation between physiological parameters (ECHO E F) scores and Quality of life scores of CABG patients in experimental group in the post test by Karl person correlation method

SECTION I

Table .4.1

Frequency and Percentage Distribution of the CABG Patients Based on Their Demographic Profile

. **N=100**

Demographic Variable	Experimental group		Control group		Chi-square test value	P-value	significance
	No.	%	No.	%			
Age (Years)							Not significant
<= 50	16	32.0	25	50.0	4.195	0.124	
51-60	22	44.0	19	38.0			
>= 61	12	24.0	6	12.0			
Sex							Not significant
Male	46	92.0	45	90.0	0.122	0.727	
Female	4	4.0	5	10.0			
Religion							Not significant
Hindu	44	88.0	46	92	2.044	0.360	
Christian	2	4.0	3	6			
Muslim	4	8.0	1	2			
Education							
Illiterate	2	4	6	12	14.64	0.001**	Significant
Primary	25	50	38	76			
Secondary	23	46	6	12			
Diet							Not significant
Regular Non-Vegetarian	2	4	2	4	0.711	0.701	
Occasional Non-Vegetarian	2	4	4	8			
Pure Vegetarian	46	92	44	88			

P<0.001 Highly Significant**

Table No.4.1 shows the distribution of CABG patients by their selected demographic variables for the experimental group and control group. 44% and 38% of the experimental and control group patients are with the age group of 51 to 60 years old. The non-significant p-value of the chi-square test reveals that the age wise distribution has been similar for the two groups.

Most of the patients are males in both the groups. The chi-square test also infers that the sex wise distribution has been similar in the two groups of CABG patients. Except educational status of the patients, the other two variables namely Diet and Religion of the patients are statistically similar. Regarding the educational status, 46% of the control group patients are qualified with Secondary education compared to the 12% in the experimental group. The significant p-value of the corresponding chi-square test reveals that educational status of the patients has been different for the two groups.

From the Table no.1, it is concluded that except educational qualification, the patients in the two groups are similar on age of the patients, sex of the patients, religion they practice and the diet pattern. Hence, the two groups are comparable.

Table 4.2

Frequency And Percentage Distribution of the CABG Patients Based On Their Clinical Profile

N=100

Clinical profile	experimental group		Control group		Chi-square test value	P-value	Significance
	No.	%	No.	%			
Presence of comorbid condition							Not significant
Diabeties Mellitus	11	22	14	28	1.150	0.765	
Hypertension	6	12	4	8			
Both	14	28	16	32			
Nil	19	38	16	32			
Presence of Unhealthy habits							Not significant
Nil	20	40	18	36	0.740	0.946	
Smoker	5	10	4	8			
Alcoholic	4	8	3	6			
Both	19	38	21	42			
Pan Chewing	2	4	4	8			
No. of Vessels blocked							Not significant
Single	2	4.0	2	4.0	0.103	0.950	
Double	5	10	6	12			
Triple	4 3	8 6	42	84			

P<0.001 Highly Significant**

Table No.4.2 shows the clinical profile and habits of the CABG patients by group wise. The common morbidities related to CABG namely Diabetes Mellitus and Hypertension (known cases) have been studied. In that ,morbidity status is almost equally distributed. The chi-square test also infers that two groups are similar with respect to the morbidity status of the patients.

Similarly, the habit of the patient and No. of vessels blocked are compared using the chi-square test. The non-significant p-values of the two variables infer that patients are similar with respect to habit and no. of vessels blocked. From table no.2 , it has been concluded that the CABG patients are similar with respect to the morbidity status, Habits and No. of vessels. Further, two groups are comparable.

Table No 4. 3

Age wise distribution of activity tolerance of men CABG patients of the experimental group in the pre and post test I&II

N =46

Age group (men)	number	Pre test activity tolerance(maximum oxygen capacity)	Post test I activity tolerance(maximum oxygen capacity)	Post test tolerance (maximum oxygen capacity
40-49	12	16.5	20.25	25.16
50-59	21	14.14	18.42	22.09
60-69	15	14.66	17.88	22
70-79	2	13.5	14.5	15.5

Table 4.3 shows that the activity tolerance (maximum oxygen capacity) in the experimental group had improved in the age group of 60 -69 (male), from low to fair capacity in post test II. But in case of other age groups, it remains low only.

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Table: 4.4

Age wise distribution of activity tolerance of men CABG patients of the control group in the pre and post test I&II

N=45

Age group (men)	number	Pre test activity tolerance(maximum oxygen capacity)	Post test I (maximum oxygen capacity	Post test II (maximum oxygen capacity)
30-39	2	13	16	16.5
40-49	22	12.36	15.8	17.3
50-59	18	13.16	15.44	16.16
60-69	8	13.37	14.87	16

Table No 4.4 shows that activity tolerance (maximum oxygen capacity) in control group (male) remains low in all the age groups in post test I &II .

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Table No: 4.5

Age wise distribution of activity tolerance of female CABG patients of the intervention group in the pre and post test I&II

N = 4

Age group (female)	Number	Pre test activity(maximum oxygen capacity)	Post test I activity tolerance(maximum oxygen capacity)	Post test II activity tolerance(maximum oxygen capacity)
50-59	2	16	20	23
60-69	2	13	18	22

Table 4.5 shows that the activity tolerance (maximum oxygen capacity) in the experimental group has improved in the age group of 60-69 (female) from low to fair capacity in post test II. But in case of other age groups, it remains low only.

Table No 4.6

Age wise distribution of activity tolerance of female CABG patients of the control group in the pre and post test I & II

N = 5

Age group (female)	number	Pre test activity tolerance (maximum oxygen capacity)	Post test I activity tolerance(maximum oxygen capacity)	Post test II activity tolerance (maximum oxygen capacity)
40-49	3	14	16	18
50-59	2	13	14	16

Table 4.6 shows that the activity tolerance (oxygen capacity) in control group (female) remains low in all the age groups in post test I &II .

Table No 4.7

Assessment of physiological parameters (ECG ST depression) among CABG patients in experimental group vs control group in the pre and post test

N=40

Physiological parameters (ECG - ST depression scores)	Experimental group(ECG-ST Depression scores)			Control group(ECG-ST Depression scores)		
	Mild Ischaemic (1-2)mm	Moderately Ischaemic (2-3)mm	Severely Ischaemic (3-4)mm	Mild Ischaemic (1-2)mm	Moderately Ischaemic (2-3)mm	severely Ischaemic (3-4)mm
Pre test	-	1	19	-	6	14
Post test	-	16	4	-	10	10

Table No 4.7 shows experimental group based on ECG (ST depression) scores in pre test Out of 20 subjects; 19 of them are Severely ischemic and 1 of them is in moderately `ischaemic stage. In case of post test after cardiac rehabilitation post test, 4 of them are severely is ischaemic stage and 16 of them are in moderately ischaemic stage. ST depression overall post mean value comes to mild ischemic stage. Therefore, there is greater improvement in ECG (ST depression) value. In control group based on ECG (ST depression), out of 20 subjects in pre test 14 subjects are severely ischemic and 6 of them were moderately ischaemic. But in case of post test I0, are in severely ischaemic stage, 10 are in moderately ischaemic stage. Overall post test mean value score has been reduced to moderately ischemic stage to some extent.

Table No 4.8

Assessment of Physiological Parameters (Echo -EF s cores) among CABG Patients in Experimental VS Control group in the Pre and Post test.

N = 100

Physiological parameters (ECHO - EF scores)	experimental group (ECHO-EF scores)			control group.(ECHO-EF scores)		
	Normal LV function (Above 50 EF)	Mild LV dys function (40-49 EF)	Moderate LV dys function (30-39 EF)	Normal LV Function (Above 50 EF)	Mild LV dysfunction (40-49 EF)	Moderate LV dysfunction (30-39 EF)
Pre test	19	25	6	19	21	10
Post test	21	23	6	21	24	5

Table 4.8 shows the level of Echo ejection fraction scores in experimental group. In pre test Echo (ejection fraction) scores, Out of 50 subjects, 19 of them have normal score, 25 of them have mild LV dysfunction and remaining 6 subjects have moderate LV dysfunction. But in case of post test , 1 out of them have normal, 23 of them have mild LV dysfunction and 6 of them had moderate LV dysfunction. After cardiac rehabilitation programme this is reduced to normal. In case of control group based on Out of 50 subjects, in pre test, 19 of them have normal LV function, 21 of them have mild ventricular dysfunction, 10 of them have moderate LV dysfunction. But in post test 21 of them are normal, 24 of them have mild LV dysfunction and 5 of them are remaining in moderate LV dysfunction. Overall mean value remains the same.

SECTION – III

Table 4.9

Comparison of activity tolerance scores of CABG Patients in experimental group between pre and post test I &II

N = 50

Activity Tolerance	Mean	SD	Mean Df	DF	't' value	P value
Pre test	14.84	2.65				
Post test I (30 days)	18.52	2.41	3.68	49	14.82	.001**
Pre test	14.84	2.65				
Post test II (60 days)	22.30	3.32	6.60	49	15.68	001**

Highly Significant P<0.001**

To compare the mean pre test vs post test I and post test II activity tolerance score of the sample in the experimental group, the null hypothesis is stated as follows.

Ho1:

There will be no significant difference between the pre test vs post test I and II activity tolerance scores of experimental group. The hypothesis is tested using paired 't' test method.

Table No 4.9 portrays that the mean post test level of activity tolerance scores of the post test is done at 30 days (18.52) and the post test is done at 60 days (22.30). The obtained 't' values of both are 14.82 and 15.68, respectively. This shows that the difference between the two mean 3.68 and 6.60 respectively is a true different which is highly Significant at 0.001 level. So, the above findings support research hypothesis. Therefore, the researcher rejects null hypothesis and accepts research hypothesis. It is due to the effectiveness of cardiac. rehabilitation programme.

Table No 4.10

Comparison of activity tolerance scores of the s CABG patients in control group between the pre and post test I&II

N = 50

Activity Tolerance	Mean	SD	Mean Df	DF	't' value	P value
Pre test Post test I (30 days)	13.28 14.88	1.89 1.94	1.600	49	14.62	.001**
Pre test Post test II (60 days)	13.28 15.70	1.89 1.60	2.520	49	21.80	. 001**

P<0.001** Highly Significant

Table 4.10 portrays that the mean post test level of activity tolerance scores in the post test I (30 days) is 14.800 and in post test (60 days) 15.700. The obtained 't' values are 14.62 and 21.80 respectively with the mean difference of 1.600 and 2.520 which is significant at .001 level.

Table No 4.11

Comparison of activity tolerance scores of CABG patients between i Experimental Vs control group in post test I&II

N = 100

Activity Tolerance	Mean Values		Mean Difference	SD	't' value	'p' value
	Experimental group	Control Group				
Post test I	18.52	14.8	3.72	2.41	8.47	0.001**
Post test II	22.3	15.7	6.60	3.32	12.63	0.001**

P<0.001** Highly Significant

To compare mean post test scores of activity tolerance of the samples in the experimental and control group, the null hypothesis is tested as follows.

Ho2:

There will be no significant difference between post test I & II Level of activity tolerance scores of the samples in the experimental vs control group at 0.05 level of significant.

The hypothesis is tested using independent 't' test method. Table 4.11 , illustrates that the mean post test level of activity tolerance scores of the experimental group both in post test I (18.52) and post test II (22.3) are greater than the mean post test activity tolerance score of control group post test 1 (14.8) and post test II (15.7). The difference in the activity tolerance scores between the intervention group and control group is statistically highly significant for both for both post test I comparison (t= 8.47 ,p = .001 level) and post test II (t = 12.63 p= 0.001 level). This illustrates that the mean difference of post test I (3.72) and post test II (6.60) is a true different. The above findings support the research hypothesis. So, the researcher rejects the null hypothesis and accepts the research hypothesis.

Table No 4.12

Comparison of physiological parameters (Heart Rate) scores of the CABG patients in experimental group in the pre and post test I&II

Physiological Parameters (Heart Rate)	Mean	SD	Mean Df	DF	't' value	P value
Pre test	89.38	11.54	1.66	49	4.13	.001 **
Post test I (30days)	87.20	8.75				
Pre test	89.38	11.54	1.740	49	2.77	0. 008 *

p<.001** highly significant p<.01 significant

To compare the mean pre test Vs post test I and post test II heart rate score of the sample in the experimental group, the null hypothesis is stated as follows.

Ho3:

There will be no significant difference between the pre test Vs post test I and II heart rate scores in the experimental group.

The hypothesis is tested using paired 't' test method.

Table No 4.12 portrays the mean post test level of heart rate scores on the post test (30days) (87.20) and in post test (60days) (87.64). The obtained 't' values are 0.001 and 0. 008, respectively which are significant at .001 level in post test 1 and significant in post test II at 0.01 level. The mean differences are 1.66 and 1.74 . Hence the researcher rejects null hypothesis and accepts research hypothesis.

Table No 4.13

Comparison of physiological parameters (Heart Rate) scores of the CABG patients in control group in the pre and post test I&II

Physiological Parameters (Heart Rate)	Mean	SD	Mean Df	DF	't' value	P value
Pre test	87.72	6.28	1.000	49	3.03	
Post test I	86.72	5.81				0. 004 *
Pre test	87.72	6.28	0.320	49	0. 73	0. 467#

P<.01* significant # - Not Significant

Table No4.13 portrays that the mean post test level of heart rate scores on the post test 30days is 86.720 and in post test II 60days is 87.400. The obtained 't' values are 3.03 and .73, respectively with the mean differences of 1.000 0.320 and which are significant at post test I at .01 level and are not significant at post test II at .01 level.

Table No 4.14

Comparison of Physiological Parameters Heart Rate (HR) Scores of the CABG Patients Between Experimental VS Control Group in Post test I & II

N=100

Physiological Parameters Heart Rate	Mean Values		Mean difference	SD	't' value	'p' value
	Experimental group	Control Group				
Post test I	87.20	86.72	6.48	8.75	0.323	0.748#
Post test II	87.64	87.40	0.24	8.51	0.169	0.866#

- Not significant

To compare mean post test scores of heart rate of the samples in the experimental and control group, the null hypothesis is tested as follows

HO 4:

There will be no significant difference between post test level of heart rate scores of the samples in the experimental vs control group at 0.01 level of significance.

The hypothesis is tested using independent 't' test method.

This table No 4.14 shows that the mean post test level of heart rate scores of the experimental group post test I (87.20) and post test II (87.64) are greater than the mean post test score of control group post test 1 (80.72) and post test II (87.40). The obtained 't' values of post test I (0.323) and post test II (0.469) are not statistically significant at 0.0 1level. So, the researcher rejects the research hypothesis and accepts the null hypothesis. .

Table No 4.15

Comparison of Physiological Parameters (ECG ST Depression) Scores of the CABG Patients in Experimental group in the Pre and Post Test

N = 20

Physiological Parameters ECG S T Depression scores	Mean	SD	Mean Df	DF	't' value	P value
Pre test	3. 95	0. 22	2. 6	19	18.42	.001**
Post test (60 days)	1.3 5	0.48				

P<0.001** Highly Significant

To compare the mean pre test Vs post test I (60 days) ECG (ST Depression) score of the sample in the experimental group, the null hypothesis is stated as follows.

Ho3:

There will be no significant difference between the pre test Vs post test I ECG (ST Depression) scores in experimental group.

The hypothesis is tested using paired 't' test method.

Table No 4.15 portrays t the mean post test level of ECG (ST Depression) scores on the pre test (3.95) and post test (60 days) (1.35). The obtained 't' value is 18.42 which is highly significant at 0.001 level. This is due to the mean difference 2.6 . The above findings support the research hypothesis. Hence the researcher rejects null hypothesis and accepts research hypothesis

Table No 4. 16

Comparison of physiological parameters (ECG ST depression) scores of the CABG patients in control group in the pre and post test

N = 20

Physical Parameters (ST Depression scores)	**Mean**	**SD**	**Mean Df**	**DF**	**'t' value**	**P value**
Pre test	3. 7	0. 47	1.40	19	9.20	.001**
Post test I (60 days)	2. 00	0. 32				

P<0.001** Highly Significant

Table No 4.16 portrays that the mean post test level of ECG ST Depression scores on the pre test is 3.7 and post test I 60 days is 2.00. The obtained 't' value is 9.20 . The mean difference is 1.40 which is highly significant at .001 level.

Table No 4.17

Comparison of physiological parameters (ECG ST Depression) scores of the CABG patients between Experimental vs control group in Post test

N = 40

Physiological Parameters ECG ST Depression	Mean Values	SD	MD	't' value	'p' value
	ECG -ST Depression scores				
Post test [experimental group]	1.3 5	0.4 8	0.75	6.568	0.001**
Post test [control group]	2. 00	0. 32			

P<0.001** Highly Significant

To compare mean post test ECG (ST depression) scores of the samples in the experimental vs control group, the null hypothesis is tested as follows.

H04:

There will be no significant difference between post test level of ECG (ST depression) scores of the samples in the experimental vs control group at 0.05 level of significant.

The hypothesis is tested using independent 't' test method.

This table No 4.17 illustrates that the mean post test level of ECG (ST Depression) of the experimental group post test (1.35) is lesser than the mean post test score of control group post test (2.00). The difference in ECG ST Depression Scores between the intervention and control group is statistically highly significant at for post test comparison (t=.6.598,p = 0.001) level. This illustrates that the mean difference of post test (0. 75) is a true different. The above findings support the research hypothesis. So, the researcher rejects the null hypothesis and accepts the research hypothesis.

Table No 4.18

Comparison of physiological parameters (Echo Ejection fraction scores) of CABG patients in experimental group, in the pre and post test

N = 50

	Mean	**SD**	**MD**	**DF**	**'t' value**	P value
Pre test	49.52	10.50	2.100	49	3.815	
Post test	51.62	9.88				.001**

P<0.001** Highly Significant

To compare the mean pre test Vs post test Echo Ejection Fraction Scores of the sample in the experimental group, the null hypothesis is stated as follows

Ho3

There will be no significant difference between the pre test Vs post test echo ejection fraction scores in experimental group.

The hypothesis is tested using paired t test method.

Table No 4.18 shows that in the experimental group, the mean pre test, Ef score is 49.52 and in post test, EF score 51.62. The obtained 't' value is 3.815 which is highly significant at .001 level. The above findings support research hypothesis. So the researcher rejects null hypothesis and accepts research hypothesis.

Table No 4.19

Comparison of physiological parameters Echo (ejection fraction) scores of the CABG patients in control group in the pre and post test

N = 50

	Mean	**SD**	**Mean Df**	**DF**	**'t' value**	**P value**
Pre test	49.38	8.329	0.420	49	0.582	
Post test	49.80	8.673				. 563#

- Not significant

Table No 4.19 shows that the experimental group mean pre test Ef score is 49.38, and in post test, Ef score is 49.80 . The obtained 't' value is 0. 582 which is not significant at .01 level.

Table No 4. 20

Comparison of physiological parameters Echo (ejection of fraction) scores of the CABG patients between Experimental vs control group in post test

N=100

Post test	Mean values	SD	MD	't' value	P value
Experimental group	51.62	9.88	1.82	.97	0.33 #
Control group	49. 80	8.67			

- not Significant

To compare mean post test scores of the samples in the experimental and control group null hypothesis is stated as follows.

Ho4

There will be no significant difference between posttest level of Echo Ejection Fraction Scores of the sample in the experimental Vs control group at .01 level of significant.

The hypothesis is tested using independent t test method.

Table No 4.20 portrays that the comparison of post test echo EF scores in experimental group(51.62) is statistically higher than the control group(49. 80). The difference between the experimental and control group is statistically highly significant for post test comparison (t = .97 p=0. 33) which is not significant at .05 level. The above findings support null hypothesis. So the researcher rejects research hypothesis and accepts null hypothesis.

Table No 4.21

Comparison of Quality of life scores of the CABG patients in Experimental group in the pre and post test I

N=50

Quality of life Components	Pre Test		Post test I		Mean Df	DF	't' value	P value
	Mean	SD	Mean	SD				
Physical functioning	46.60	2 4.27	63.00	17.14	16.40		7.430	.001**
Role Limitation physical	43.00	40.06	48.60	35.97	5.60		1.234	0.22#
Role limitation emotional	40. 00	43.6	48.46	38.86	8.75		2.358	0.02#
Vitality	37.00	16.53	55.76	11.82	18.76	49	10.434	001**
Emotional wellbeing	37.10	21.48	56.68	12.57	19.58		6.559	001**
Social functioning	40.98	23.47	60.56	16.40	19.61		2. 642	.005 *

- Not significant P <.01* significant P < .001** highly significant

- QOL in physical functioning mean pre test score is 46.60 and post test I score is 63.00 The obtained t value post test I score is 7.43 Which is highly significant at 0.001 level.
- QOL in role limitation physical mean pre test score is 43.00 and post test I score is 48. 46 The obtained t value post test I score is 1.234 Which is not significant at 0.01 level.
- QOL in role limitation emotional mean pre test score is 40 and post test I score is 48.46 The obtained t value post test I score is 2.358 Which is not significant at 0.0 1 level.
- QOL in vitality mean pre test score is 37. 10 and post test I score is 55.76 The obtained t value post test I score is 10.434 which is significant at .001 level.

- QOL in emotional wellbeing mean pre test score is 37.10 and post test I score is 56.68 The obtained t value post test I score is 6.559 which is significant at .001 level.
- QOL in social functioning mean pre test 40.98 and post test I 60. 56 The obtained t value post test I score is 2.642 which is significant at . 01 level
- QOL in pain recovery mean pre test score is 38.24 and post test I score is 56.52 . The obtained t value post test I score is 3.30 which is significant at .01 level.
- QOL in general health mean pre test score is 51.22 and post test 1 score is 65.24 .The obtained t value score is significant at . 01 level.
- The above mean values are high in physical functioning, vitality, emotional wellbeing shows significant changes in post test 1level.

Table No 4. 22

Comparison of Quality of life scores of the CABG patients in experimental group in the pre and post test II

N=50

Quality of life Components	Pre test		Post test II		Mean Df	DF	't' value	P value
	Mean	SD	Mean	SD				
Physical functioning	46.60	2 4.27	79.00	15.41	32.40		10.233	.001**
Role Limitation physical	43.00	40.06	56.60	30.48	12.40		1.516	0. 133
Role limitation emotional	40	43.6 0	6 1	3 2.33	21.55		4.200	.001**
Vitality	37. 00	16.53	71.74	10.02	34.74	49	14.048	001**
Emotional wellbeing	37.10	21.48	72.96	9.92	35.86		10.622	.001**
Social functioning	40.98	23.47	75. 7	14.06	34.6 5		5.977	.001**
Pain recovery	38 .24	16.56	70 .54	16.88	32.03		7.262	.001**
General Health	51.22	8.05	72.40	8.97	21.18		6.036	.002 *

- Not significant p<.01* significant P<0.001** Highly Significant

To compare the mean pre test vs post test I and II of quality of life score of the sample in the experimental group, the null hypothesis is stated as follows

Ho5:

There will be no significant difference between the pre test Vs post test I and 2 quality of life scores in experimental group.

The hypothesis is stated using paired 't' test method.

Table 4.22 and 23 show that the comparison of mean post test quality of life scores of CABG patients in experimental group.

- QOL in physical functioning mean pre test score is 46.6 , post test I score is 63.00 and post test II score is 79.00 . The obtained t value post test I score is 7.430 and post test II score is 10.233. which is highly significant at 0.00 1 level.
- QOL in role limitation physical mean pre test score is 43. post test I score is 48.60 and post test II score is 56.6 . The obtained t value post test I score is 1.234 and post test II score is 1.516. which is not significant at 0.01 level.
- QOL in role limitation emotional mean pre test score is 40 , post test I score is 48.86 and post test II score is 61. The obtained t value post test I score is 2.358 which is not significant at .0 1level in posttest1 and post test II score is 4.200 which is significant at 0.00 1 level.
- QOL in vitality mean pre test score is 37 , post test I score is 55.76 and post test II score is 71.74 . The obtained t value post test I score is 10.434 and post test II score is 14.048 which is significant at .001 level.
- QOL in emotional wellbeing mean pre test score is 37.10 , post test I score is 56.68 and post test II score is 72.96 . The obtained t value post test I score is 6.559 and post test II score is 10.622 which is significant at .001 level.
- QOL in social functioning mean pre test 40.98 , post test I 60.56 and post test II 75. 7 . The obtained t value post test I score is 2.642 and post test II score is 5.9770 which is significant at .01 level in post test 1 and significant at .001 level in post test 2.
- QOL in pain recovery mean score of pre test score is 38.24 , post test I score is 56.52 and post test II score is 70 .54. The obtained t value 3.306 post test I score

is not significant at .01 level and post test II score is 7.262 which is significant at . 01 level.

- QOL in general health mean score of pre test score is 51.22 , post test I score is 65.24 and post test II score is 72.40. . The obtained t value post test I score is 3.223 and post test II score is 6.036 which are significant at .01 level in posttest1 and it is significant at .001 level in posttest2.

There is significant differences in all parameters except pain. In post test I the obtained 't' value is 1.306 and role limitation physical post test I and post test II .

The obtained 't' values of 1.234 and 1.516 which are not significant at 0.01 level.

The above findings of Physical functioning, Role limitation emotional, Vitality, Emotional wellbeing, and Social functioning show significant changes in post test.

Hence the researcher rejects null hypothesis and accepts research hypothesis.

Table No 4.23

Comparison Quality of life scores of the CABG patients in control group in the pre and post test I

N=50

Quality of life Components	Pre Test		Post test I		Mean Df	DF	't' value	P value
	Mean	SD	Mean	SD				
Physical functioning	28.50	23.21	37.70	16.91	9.20		2.265	.005 *
Role Limitation physical	34.60	29.01	40.70	27.46	6.10		1.080	. 310#
Role limitation emotional	27.12	23.98	34.22	24.14	7.10		1.475	. 215#
Vitality	15.06	11.17	32.22	10.70	17.15	49	7.832	.001**
Emotional wellbeing	18.72	16.50	36.32	17.99	17.60		5.097	.001**
Social functioning	28. 50	20. 12	51.24	19. 09	22.60		5.756	. 001**
Pain recovery	31.08	9.94	53.06	11.34	21.74		10.262	.001**
General Health	47.50	12.58	59.96	8.10	12.50		5.903	.001**

- Not significant P<.01* significant P< .001** highly significant

- QOL in physical functioning mean pre test score is 28.50, and post test I score is 37.70 . The obtained t value of post test I score is 2.265 which is significant at .01 level.
- QOL in role limitation physical mean pre test score is 34.60 , and post test I score is 40.700. The obtained t value post test I score is 1.080 which is not significant at .01 level.
- QOL in role limitation emotional mean pre test score is 27.12 , and post test I score is 34.22 . The obtained t value post test I score is 1.475 which is not significant at .01 level.

- QOL in vitality mean pre test score is 15.06 and post test I score is 32.22 The obtained t value post test I score is 7.832 which is significant at .001 level.
- QOL in emotional wellbeing mean pre test score is 18.72 , and post test I score is 36.32 . The obtained t value post test I score is 5.097 which is significant at .001 level.
- QOL in social functioning mean pre test 28. 50 and post test I 51.24. The obtained t value post test I 5.756. which is significant at . .00 1 level.
- QOL in pain recovery mean score of pre test score is 31.08 and post test I score is 53.06 The obtained t value post test I score is 10.262 which is significant at .001 level.
- QOL in general health mean score of pre test score is 47.50 and post test I score is 59.96.The obtained t value post test I score is 5.903 which is significant at .001 level.

Table No 4.24

Comparison of Quality of life scores of the CABG patients in control group in the pre and post test II

N=50

Quality of life Components	Pre test		Post test II		Mean Df	DF	't' value	P value
	Mean	SD	Mean	SD				
Physical functioning	28.50	23.21	47.30	15.53	18.800		2.954	.005*
Role Limitation physical	34.60	29.01	48.20	24.63	13.600		1.438	.224#
Role limitation Emotional	27.12	23.98	39.12	22.74	7.100		1.045	.356#
Vitality	15.06	11.17	41.46	11.48	36.300	49	4.162	.001**
Emotional wellbeing	18.72	16.50	43.00	17.29	2.480		1.893	.006 *
Social functioning	28.60	20.12	59.30	13. 19	30.750		2.466	.005 *
Pain recovery	31 .08	9.94	61.54	9. 4	30.22		4.722	.005 *
General Health	47.50	12.58	62. 66	7.00	15.200		1.785	.007 *

-Not significant P<.01* Significant P<0.001** Highly Significant

Table No 4.24 and 25 show the comparison of mean post test quality of life scores of CABG patients in control group.

- QOL in physical functioning mean pre test score is 28.50 , post test I score is 37.70 and post test II score is 47.30 . The obtained t values of post test I score is 2.265 and post test II score is 2.954 which are significant at .01 level.
- QOL in role limitation physical mean pre test score is 34.60, post test I score is 40.70 and post test II score is 48.20 . The obtained t values of post test I score is 1.080 and post test II score is 1.438 which is not significant at .01 level.

- QOL in role limitation emotional mean pre test score is 27.12 , post test I score is 34.22 and post test II score is 39.12 . The obtained t values of post test I score is 1.475 and post test II score is 1.045 which is not significant at .01 level.
- QOL in vitality mean pre test score is 15.06 , post test I score is 32.22 and post test II score is 41.46 . The obtained t values of post test I score is 7.832 and post test II score is 4.162 which is significant at .001 level.
- QOL in emotional wellbeing mean pre test score is 18.72 , post test I score is 36.32 and post test II score is 43.00 . The obtained t values of post test I score is 5.097 and post test II score is 1.893 which is significant at .001 level and it is significant at .01 level in post test II.
- QOL in social functioning mean pre test 28. 50 , post test I 51.24 and post test II 59.30 The obtained t values of post test I 5.756 which is significant at .001 level, and in post test II 2.466 which is significant at . 01 level.
- QOL in pain recovery mean score of pre test score is 31.08 , post test I score is 53.06 and post test II score is 61.54 . The obtained t values of post test I score is 10.262 which is significant at .001 level and in post test II score is 4.722 which is significant at . 01 level.
- QOL in general health mean score of pre test score is 47.50, post test I score is 59.96 and post test II score is 62. 66 . The obtained t values of post test I score is 5.903 and post test II score is 1.785 which is significant at post test1 at .001level and at .01 level in post test II .

Table No 4. 25

Comparison of Quality of life scores of the CABG patients between experimental group vs control group in the post test I&II

N = 100

QOL Components		Mean Values		Mean Difference	SD	't' value	'p' value
		experimental group	Control Group				
Physical functioning	Post 1	63	37.7	25.300	17.14	7.43	0.00 1**
	Post 2	79	47.3	31.700	15.41	10.23	0.00 1**
Role limitation physical	Post 1	48.6	40.7	7.900	35.97	1.23	0.220#
	Post 2	56.6	48.2	8.400	30.48	1.51	0.133#
Role limitation Emotional	Post 1	48.4 6	34.2	15.200	38.86	2.35	0.020#
	Post 2	61	39.12	22.120	32.33	4.20	0.00 1**
Vitality	Post 1	55.76	32.22	23.540	11.82	10.43	0.00 1**
	Post 2	71.44	41.46	30.280	10.02	14.04	0.00 1**
Emotional wellbeing	Post 1	56.68	36.32	20.300	12.57	6.55	0.00 1**
	Post 2	72.96	43	29.900	9.92	10.62	0.00 1**
Social functioning	Post 1	60.56	51.2	9.430	16.40	2.64	0.010#
	Post 2	75.7	59.35	16.320	14.06	5.97	0.00 1**
Pain recovery	Post 1	56.52	53.09	3.500	15.46	3.306	0.00 1**
	Post 2	70. 54	61.55	8.890	16.88	7.26	0.00 1**
General Health	Post 1	65.24	60	5.240	8.14	3.22	0.002 *
	Post 2	72.46	62.7	9.700	8.97	6.03	0.00 1**

- Not significant p <.01* significant P<0.001** Highly Significant

To compare mean post test quality of life scores of the samples in the experimental Vs control group, the null hypothesis is tested as follows.

H06:

There will be no significant difference between post test level of quality of life scores of the samples in the experimental Vs control group at 0.01 level of significant.

The hypothesis is tested using independent 't' test method.

This table No4.25 shows the mean post test level of quality of life scores of the experimental group.

In physical functioning, scores of post test I (63) and post test II (79) are higher than the mean post test score of control group post test I (37.7) and post test II (47.3). The obtained 't' value of post test I (7.43) and post test II (10.230) are statistically significant at 0.001 level. This illustrates that the mean difference of post test I (25.300) and post test II (31.700) are a true difference.

Role limitation physical scores post test I (48) and post test II (56.66) is higher than the mean post test score of control group post test I is (40.7) and post test II are (48.2). The obtained 't' values of post test I (1.200) and post test II (1.500) are not statistically significant at 0.01 level

- Role limitation emotional scores of post test I (48.6) and post test II (61) are higher than the mean post test score of control group post test I (34.2) and post test II (39.12). The obtained 't' values of post test I is (2.350) it is statistically significant at .01 level and post test II (4.200) is statistically highly significant at 0.001 level. This illustrates that the mean difference post test II (22.120) is a true difference.

- Vitality scores of post test I (55.76) and post test II (71.44) is higher than the mean post test score of control group post test I (32.22) and post test II (41.46). The obtained 't' values of post test I is (10.430) and post test II are (14.040) is statistically significant at 0. 001 level. This illustrates that the mean difference of post test I (23.540) and post test II (30.280) is a true difference.
- Emotional wellbeing scores of post test I (56.68) and post test II (72.96) is higher than the mean post test score of control group post test I (36.32) and post test II (43). The obtained 't' values of post test I (20.300) and post test II are (29.900) are statistically significant at 0.05 level. This illustrates that the mean difference of post test I (6.55) and post test II (10.62) is a true difference.
- Social functioning scores post test I (60.56) and post test II are(75.7) is higher than the mean post test score of control group post test I (51.2) and post test II (59.35). The obtained 't' values of post test I (2.640) and post test II are (5.970) is statistically significant at 0.001 level. This illustrates that the mean difference of post test I (9.430) and post test II (16.320) is a true difference.
- Pain recovery scores of post test I (56.5) and post test II (70. 5) is higher than the mean post test score of control group post test I (53.09) and post test II (61.55). The obtained 't' values of post test I is (3.300)which is statistically significant at . 001 level and post test II are (7.2 60) statistically significant at 0.001 level.
- General health scores of post test I (65.24) and post test II are (72.46) is higher than the mean post test score of control group post test I (60) and post test II (62.7). The obtained 't' values of post test I is (3.200) statistically significant at .01 level and post test II are (6.030) are statistically significant at

0.001 level. This illustrates that the mean difference of post test I (5.240) and post test II (9.700) is a true different. .

- . Except role limitation physical and emotional scores above findings support research hypothesis. So, the researcher rejects null hypothesis and accepts research hypothesis.

Table No. 4.26

Mean and SD of activity tolerance of experimental group patients by assessment.

Activity Tolerance	Mean	SD	ANOVA Repeated measure test result		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	14.84	2.652	211.757	<0.001**	Pre vs post1	219.902	<0.001**
Post Assessment1	18.52	2.418			Post1vs post2	134.341	<0.001**
Post Assessment2	22.30	3.327					

P<.001** highly significant

Table No. 4.26 shows the mean and standard deviation of the activity tolerance of the experimental group CABG patients. Before intervention the mean activity tolerance level has been 14.8. After the intervention the mean activity tolerance level increases to 18.5 at the end of 4thweek and further increase at the end of 8th week to 22.3. The above mean values have been compared using one way ANOVA repeated measure test. The p-value <0.001** infers that there is a significant improvement in activity tolerance level. In order to know, when the improvement begins, "Repeated Contrast method" has been applied. The results shows at the end of 4th week itself the improvement in the activity tolerance has been observed. Further compared to post assessment1 to post assessment 2 there is an improvement in the activity tolerance level.

Table No. 4.27

Mean and SD of activity tolerance level of control group CABG patients by assessment.

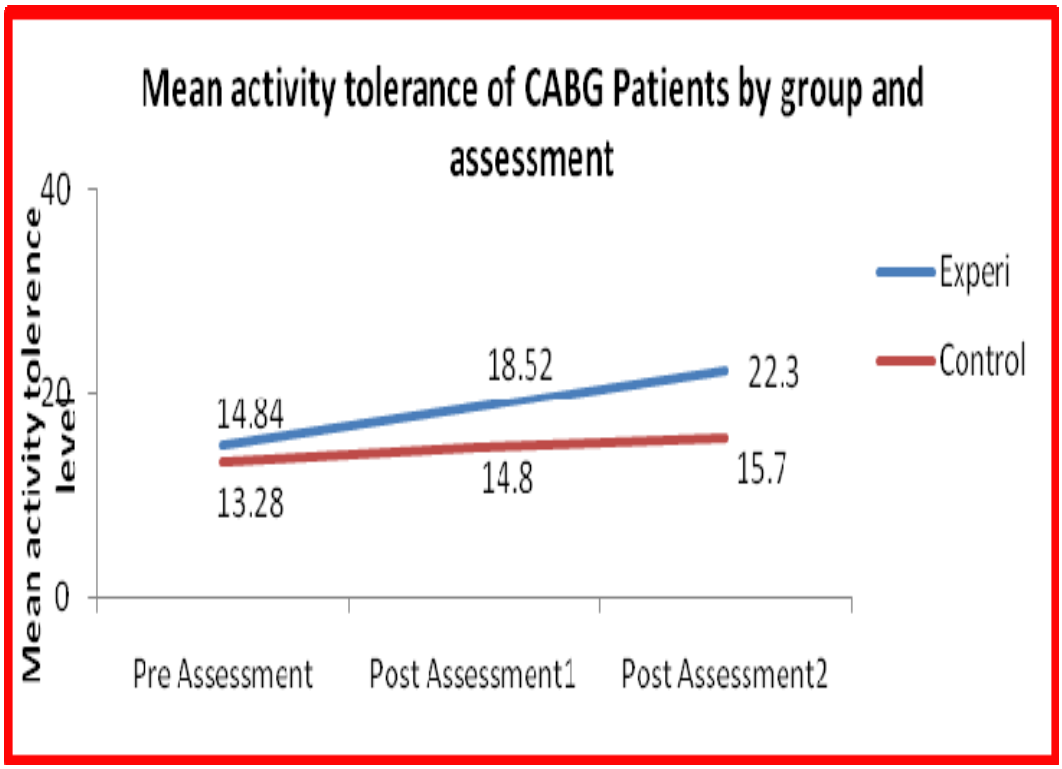
Activity Tolerance	Mean	SD	ANOVA Repeated measure test result		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	**13.28**	**1.896**	**285.033**	**<0.001****	**Pre vs post1**	**213.764**	**<0.001****
Post Assessment1	**14.80**	**1.948**			**Post1 vs post2**	**96.805**	**<0.001****
Post Assessment2	**15.70**	**1.607**					

P<.001** highly significant

Table No. 4.27 shows the mean and standard deviation of the activity tolerance level of the control group CABG patients by assessment wise. The mean activity tolerance level has been 13.2, 14.8 and 15.7 respectively at pre assessment, post assessment1 and post assessment 2. The above mean values has been compared using one way ANOVA repeated measure test. The significant p-value infers that there is an improvement in the activity tolerance level for the control group also. To know more details, "Repeated contrast test" has been applied. The comparison between "pre test and post test1" and another comparison "post test1 and post test2" has been significant at p<0.001**. This infers that in the control group there is an improvement in the activity tolerance level at the end of 4^{th} week itself. Further there is an improvement at the end of 8^{th} week also.

Figure No.4.1

Mean activity tolerance level of the CABG patients by group and assessment.



The main purpose of this figure and following table is to find out whether experimental group patients are having better activity tolerance level than the control group patients. The mean values are shown as a line diagram. Clearly the diagram indicates the improvement is higher in the experimental group compared to the control group. Since the initial preassessment levels has been different for the two groups ANCOVA test has been applied.

Table No. 4.28

2X2 ANCOVA with last variable as repeated measure test result for the activity tolerance level of CABG patients after controlling with pre assessment level and educational status

Source	F-value	p-value
Between subjects		
Pre-Assessment	93.321	.001**
Education	5.046	.027
Group	151.710	.001**
Within subjects		
Assessment	18.090	.001**
Assessment * Pre Assessment	7.904	.006
Assessment * Education	.030	.862
Assessment* Group	83.400	.001**

P<.001** highly significant

The purpose of this table No 4.28 is to find out the overall comparison of the two groups namely experimental and control groups after controlling with the pre-assessment differences and educational status of the patients. 2X2 ANCOVA test has been applied. Here the first '2' refers to two groups namely intervention and control groups and the second '2' refers to the two post assessments. Since before intervention, Educational status of the patients and pre assessment activity tolerance level has been different for the two groups, these two variables has been included as covariates in the ANCOVA test.

Between Subjects comparison

The comparison "pre Assessment" infers that post assessment activity tolerance has been highly influenced by the pre assessment level of activity tolerance . The comparison "Education" result infers that educational status of the patients also influence on activity tolerance level during the post assessments. The significant p-value of the important comparison "Group" infers that the post assessment activity tolerance level has been significantly different for the two groups after controlling the initial influences of the variables educational status and pre-assessment activity tolerance level.

Within Subjects Comparison

Since only two post assessments, the "within subject comparisons" has not discussed in detail. Overall it has been found that the results of the "Within subject comparisons" almost reflects the similar results of the "between subject comparisons" From the above results, it is concluded that the intervention is much effective in improving the activity tolerance level of CABG patients.

Heart Rate:-

Table No 4.29

Mean and SD of Heart rate of experimental group CABG patients by assessment.

Heart Rate	Mean	SD	ANOVA Repeated measure test result		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	89.38	11.546	10.136	<0.001**	Pre vs post1	17.088	<0.001**
Post Assessment1	87.20	8.760			Post1vs post2	1.680	0.201
Post Assessment2	87.64	8.511					

P<.001** highly significant

Table No.4.29 shows the mean and standard deviation of the heart rate of experimental group patients by assessment wise. Before intervention, the average heart rate had been 89.38 beats per minute. After the intervention, the average heart beat has been reduced to 87.2 and 87.6 respectively at the end of 4th week and 8th week. The significant p-value of the ANOVA test reveals that three mean values are statistically different. Further, "Repeated Contrast test" result infers that the comparison "Pre test and post test1" infers that immediately after the intervention there is an significant reduction in the heart rate. However, there is no significant change occurs between the 4th week and 8th week.

Table No. 4.30

Mean and SD of Heart rate of control group CABG patients by assessment

Heart Rate	Mean	SD	ANOVA Repeated measure test result		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	**87.72**	**6.299**	**3.597**	**0.031**	**Pre vs post1**	**9.211**	**.004**
Post Assessment1	**86.72**	**5.810**			**Post1 vs post2**	**3.403**	**.071**
Post Assessment2	**87.40**	**5.349**					

P<.001** highly significant

Table No. 4.30 shows the mean and standard deviation of the heart rate of the control patients by assessment wise. The mean heart rate has been 87.7, 86.7 and 87.4 respectively at pre assessment, post assessment1 and post assessment2. The significant p-value of the ANOVA test infers that the mean heart rate at the three assessments are statistically different. The "Repeated Contrast test" infers that there is a reduction in the heart rate at the end of the 4th week compared to the pre assessment. And also it has been observed that there is no significant change occurs in the heart rate between the 4th week and 8th week of follow up.

Figure No. 4.2

Mean Heart rate of CABG patients by group and assessment

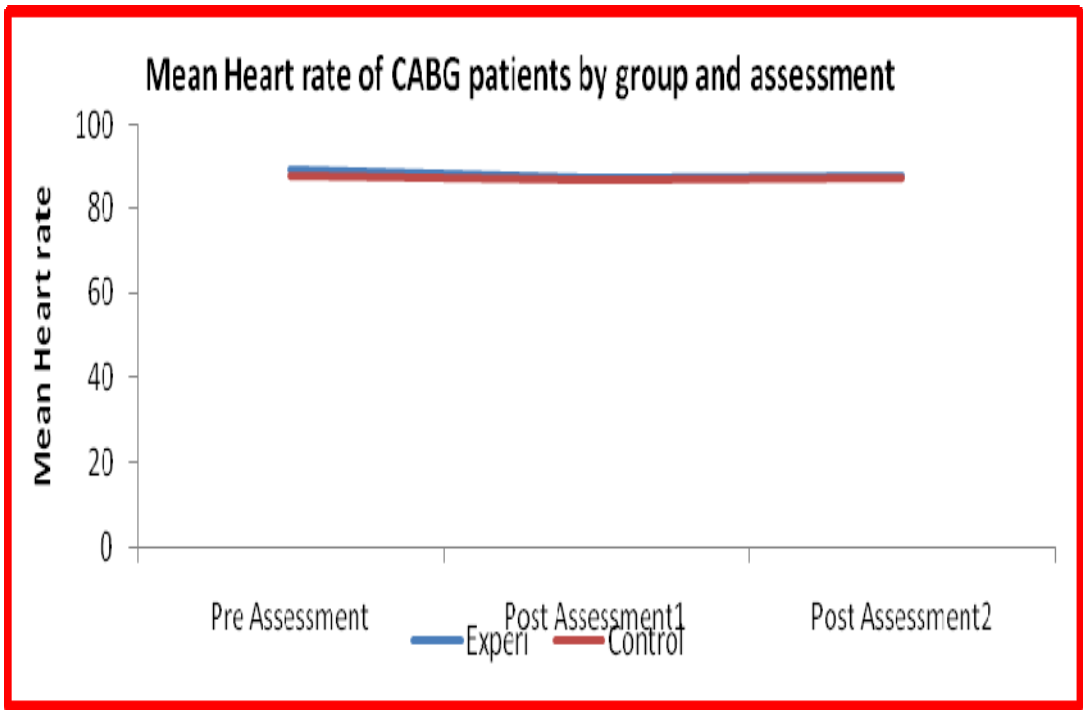


Figure No.4.2 shows the mean heart rate of the two groups at three assessments. The line diagram clearly shows there is no significant difference occurs between two groups in almost all the assessments with respect to the heart rate of the CABG patients. To verify it, 2X3 ANOVA test with last variable as repeated measure has been applied.

Table No. 4. 31

2X3 ANOVA repeated test result for the Heart rate of CABG patients

2X3 ANOVA repeated measure			**Repeated contrast test value**		
Source	**F-value**	**p-value**	**Comparison**	**F-value**	**p-value**
Between subjects					
Group	0.259	0.612			
Within subjects					
Assessment	12.27	<0.001**	Pre vs Post 1 Post1 vs Post 2	26.151 3.601	<0.001** 0.061
Assessment* Group	2.83	0.061			

P<.001** highly significant

The results of the test has been shown in table No.4.31 The non-significant p-value of the "Between Subjects" infers that in general the mean heart rate of the experimental and control group CABG patients are similar. The significant p-value of the "Within subjects- Assessment" comparison infers that irrespective of the groups, the mean heart rate is statistically different between the three assessments. To know when the difference occurs the corresponding "Repeated Contrast test" has been applied. The result of the comparison between "Pre assessment and Post assessment1" shows that in both the groups there is a reduction in the heart rate. The non-significant p-value of the "Repeated contrast test" of the comparisons "Post test1 vs Post test2" infers that heart rate remains constant between 4^{th} and 8^{th} week of follow up.

To conclude, the intervention has no significant influence on the heart rate of the CABG patients.

Quality of Life- Physical functioning

Table No. 4.32

Mean and SD of Physical functioning of experimental group CABG patients by assessment

QOL- Physical functioning	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	46.60	24.27	45.929	<0.001**	Pre vs post1	31.833	<0.001**
Post Assessment1	63.00	17.14			Post1 vs post2	104.725	<0.001**
Post Assessment2	79.00	15.40					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.32 shows the mean physical functioning level for the experimental group CABG patient. The mean physical functioning value has been 46.6 at pre test. After the intervention it has been increased to 63 and 79 respectively at the end of 4th week and 8th week. One way ANOVA test reveals that the mean values on these three assessments are statistically different. Further, "Repeated contrast test" reveals that the comparisons namely " previous Post1" and "post1 vs Post2" are significantly different at 1% level of significance. This result clearly indicates that the intervention is highly effective in improving the physical functioning of the CABG patients.

Table No. 4.33

Mean and SD of Physical functioning for the control group patients by assessment

QOL-Physical functioning	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	28.50	23.21	36.606	<0.001**	Pre vs post1	23.154	0.004
Post Assessment1	37.70	16.91			Post1 vs post2	168.460	<0.001**
Post Assessment2	47.30	15.53					

Since SD has been large, Test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.33 shows the mean and standard deviation of the physical functioning for the control group patients. Initially, before the intervention the mean physical functioning value has been 28.5, which has been increases to 37.7 and 47.3 respectively at the end of 4^{th} and 8^{th} weeks. To assess whether this difference is statistically different, one way ANOVA repeated test has been applied for the logarithmic values. The significant p-value confirms at 1% level of significance infers that the mean increase in the physical function at 4^{th} and 8^{th} weeks are different compared to the initial mean value. Further, the comparisons "pre testvs post test1" infers that the at the end of 4^{th} week, the mean physical function has been higher compared to the initial mean value of physical functioning. Similarly, the comparisons at "post test1 and post test 2" infers that mean physical functioning value at the end of 8^{th} week has been higher than mean physical functioning value at the end of 4^{th} week.

Figure No.4.3

Mean physical functioning of CABG patients by group wise and assessment .

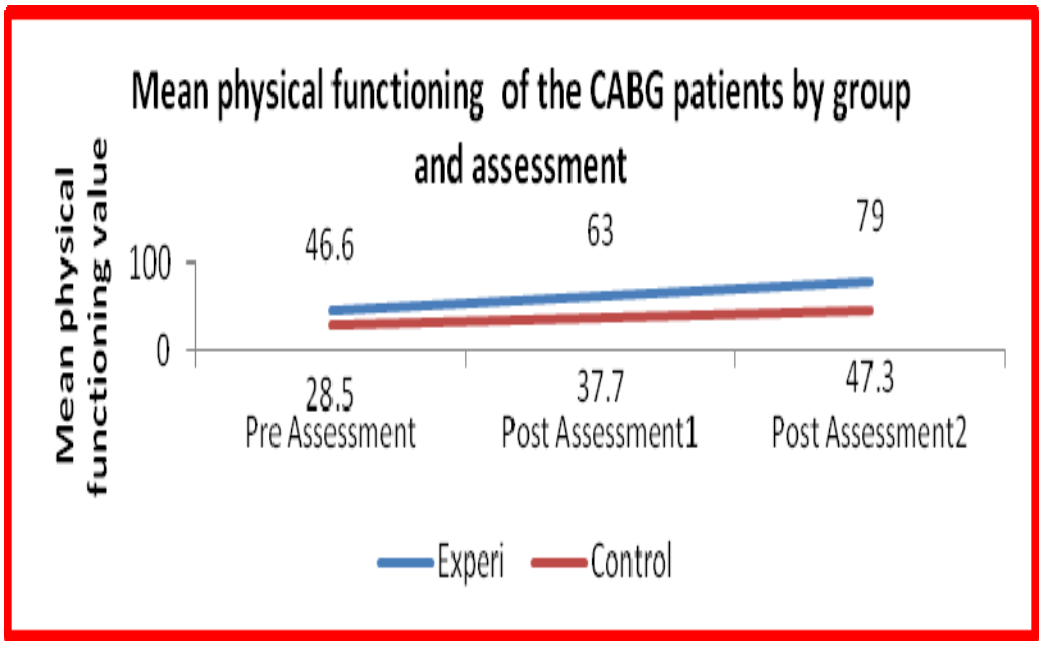


Figure No.4.3 shows the mean physical functioning value of the experimental group and control group CABG patients at three assessments. The line diagram clearly shows the control group patients are having less role of physical function level on daily activities than the experimental group patients. Since initial preassessment level has been significantly different (Table no.3) ANCOVA test has been applied to compare the two groups.

Table No. 4. 34

2X2 ANCOVA with last variable as repeated measure test result for the Physical function of CABG patients after controlling with pre assessment level and educational status

Source	F-value	p-value
Between subjects		
Pre-Assessment	47.948	.001**
Education	.282	.597
Group	41.797	.001**
Within subjects		
Assessment	56.123	.001**
Assessment * Pre Assessment	44.342	.001**
Assessment * Education	.737	.393
Assessment* Group	11.790	.001**

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.34 shows the result of 2X2 ANCOVA test with last variable as repeated measure after controlling with pre assessment level of physical functioning and educational status of the patients. Since two groups educational status and pre assessment level has been different, these two variables has been controlled using ANCOVA test. Very specifically 2X2 ANCOVA test with last variable as repeated measure has been applied. Here the first '2'refers to the two groups namely intervention and Control groups and the second '2' refers to the two post assessments namely at 4^{th} and 8^{th} weeks.

The “Between Subjects” comparison “Pre assessment” result infers that post assessment physical functions of the two groups are highly influenced by the pre assessment physical function scores.. The “Education –comparison” result infers that educational status of the CABG patients is not influenced on the post assessments of the physical function level. The “comparison - Group” result infers that in general the two groups are statistically different with respect to the physical functioning of the CABG patients after controlling the initial differences of the education status l and pre assessment of physical function level.

The “Within Subjects” comparisons also indicates the same type of results of the between subjects. Since only two post assessments, “within subjects “ comparisons are not discussed here in detail.

To conclude the intervention is effective in improving the level of physical functioning of the CABG patients.

Quality of Life- Role limitation physical on daily activities

Table No.4. 35

Mean and SD of Role limitation Physical function on daily activities of experimental group patients by assessment wise

QOL-Role limitation Physical function	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	43.00	40.064	20.383	<0.001**	Pre vs post1	34.744	<0.001**
Post Assessment1	48.60	35.971			Post1 vs post2	16.237	<0.001**
Post Assessment2	56.60	30.480					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.35 shows the mean and standard deviation of role limitation physical function of daily activities of experimental group patients by assessment wise. The mean role limitation physical function has been 43.0, 48.6 and 56.6 respectively at pre assessment, post assessment1and post assessment 2. The mean values are compared using ANOVA repeated measures test result. The significant p-value infers that the three mean values are statistically different. Further "Repeated Contrast test" result of the comparisons "Pre vs Post1" and "Post 1 vs Post 2" infers that there is a significant increase in the role limitation physical function level has been observed at each assessment. This above findings indicates that intervention is effective in improving the role limitation physical function.

Table No. 4.36

Mean and SD of Role limitation Physical function on daily activities of control group patients by assessment.

QOL-Role limitation Physical function	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	34.60	29.012	37.459	<0.001**	Pre vs post1	35.470	0.004
Post Assessment1	40.70	27.461			Post1 vs post2	39.168	<0.001**
Post Assessment2	48.20	24.635					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.36 shows the mean and standard deviation of the role limitation physical function on daily activities for the control group of CABG patients by assessment wise. The mean role limitation physical function on daily activities has been compared using ANOVA repeated measure test. The significant p-value infers that there is an increase in the mean role of physical function. The "Repeated contrast" infers that there is an improvement in the quality of life-Role limitation physical function on daily activities on each post assessment.

Figure No.4.4

Mean role limitation physical function value of CABG patients by group and assessment

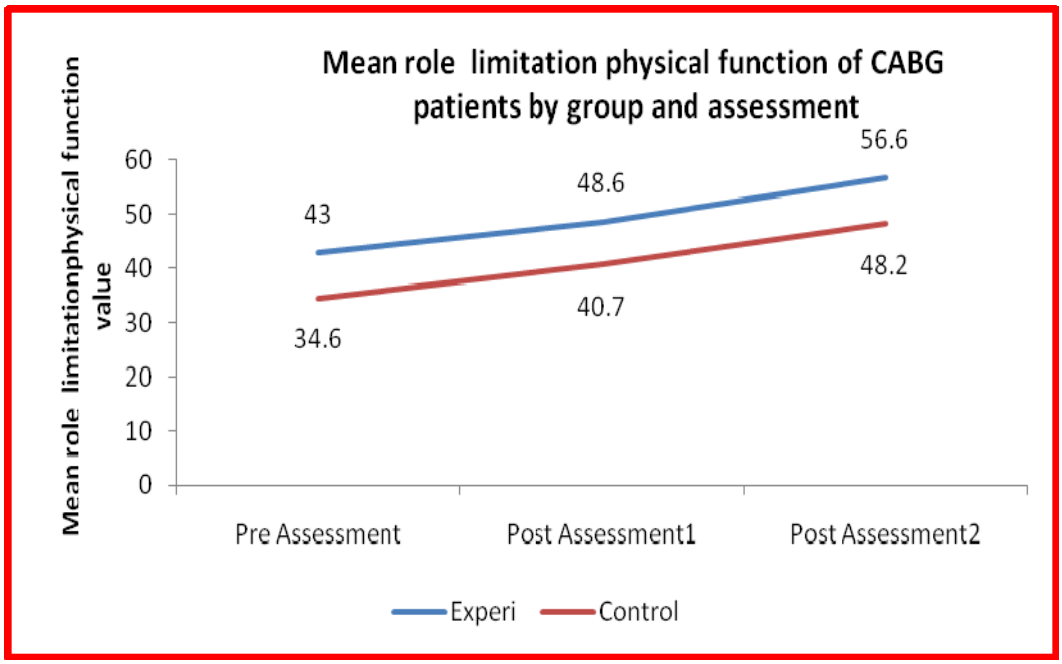


Figure No.4.4 shows the mean role limitation physical function of CABG patients by group and assessment wise. In the experimental group mean value has been higher for the experimental group patients compared to control group patients in all the three assessments. Since the pre assessments values are statistically significant (Table no.3), ANCOVA test has applied to compare the two groups.

Table No. 4.37

2X2 ANCOVA with last variable as repeated measure test result for the Role of Physical function on daily activities of CABG patients after controlling with pre assessment level and educational status

Source	F-value#	p-value
Between subjects		
Pre-Assessment	940.029	.001**
Education	2.768	.001**
Group	.003	.958
Within subjects		
Assessment	264.769	.001**
Assessment * Pre Assessment	403.548	.001**
Assessment * Education	.044	.835
Assessment* Group	10.089	.002

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Between subjects Comparisons

The comparison "Pre Assessment" result infers that it has been highly influenced on the levels of the post assessments levels of the role limitation physical function on daily activities. The non-significant p-value of the variable "Education" infers that, the educational status has no influence on the post assessment levels of the role limitation physical function on daily activities. The comparison "Group" result infers that there is no significant difference occurs in the role limitation physical

function between the experimental group and control group CABG patients after controlling with the initial differences of "pre assessment" level and educational status.

Within Subject comparisons

Since only two post assessments, the within subject comparisons results are almost parallel to the results of "Between subjects" comparisons. The significant p-value of the "Assessment*Group" infers that the changes occurs between the two post assessments are mainly due to initial differences of pre assessment only.

To conclude, the intervention is similar to the control group with respect to the role of physical function of the daily activities.

Quality of Life-Role limitation- Emotional

Table No. 4.38

Mean and SD of Role limitation-Emotional function of experimental group patients by assessment.

QOL-Role limitation Emotional	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	40	43.601	16.128	<0.001**	Pre vs post1	18.321	<0.001**
Post Assessment1	48.46	38.863			Post1 vs post2	14.550	<0.001**
Post Assessment2	61.00	32.336					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.38 shows the mean and standard deviation of the Role limitation emotional function of the CABG experimental group patients. The ANOVA repeated measure test result infers that there is a significant increase in the mean Role limitation emotional function level after the intervention. The "Repeated Contrast test" result also confirms that at each assessment there is an increase in the mean Role limitation emotional function level.

Table No. 4.39

Mean and SD of Role limitation emotional function of control group patients by assessment

QOL- Role limitation emotional	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	27.12	23.984	76.700	<0.001**	Pre vs post1	65.876	0.004
Post Assessment1	34.22	24.140			Post1 vs post2	69.099	<0.001**
Post Assessment2	39.12	22.745					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.39 shows the mean and standard deviation of the emotional function level of control group patients. In control group also, there is an increase in the mean emotional level of the CABG patients at p<0.001** level.

Figure No.4.5

Mean Role limitation emotional function of CABG patients by group and assessment.

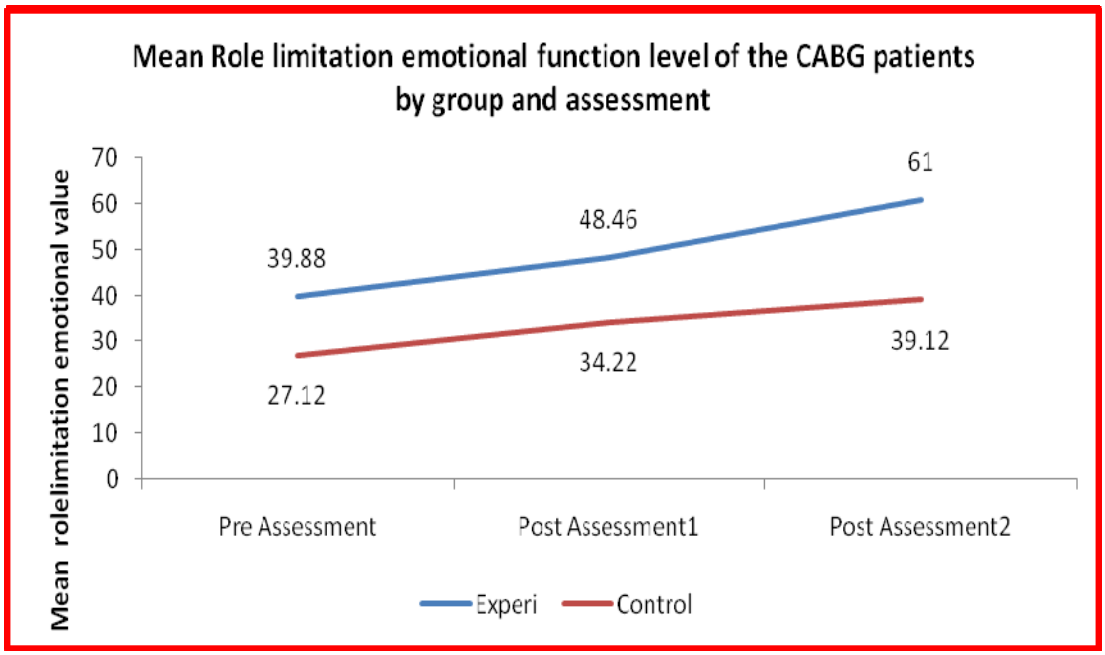


Figure No.4.5 shows the mean Role limitation emotional function level for the two group CABG patients at three assessments. The line diagram clearly indicates the experimental group patients are having higher mean value from the beginning compared to the control group patients.

Table No. 4.40

2X2 ANCOVA with last variable as repeated measure test result for the Role limitation emotional function of CABG patients after controlling with pre assessment level and educational status

Source	F-value[#]	p-value
Between subjects		
Pre-Assessment	2521.062	.001**
Education	.947	.334
Group	13.260	.001**
Within subjects		
Assessment	203.955	.001**
Assessment * Pre Assessment	190.302	.001**
Assessment * Education	.373	.543
Assessment* Group	21.745	.001**

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.40 shows the 2X2 ANCOVA test result of the Role limitation emotional function after controlling the effects of the educational status of the patients and pre assessment level. The " pre assessment" p-value infers that initial values of the Role limitation emotional functions are highly influence on the post assessments. The p-value of the "Education" infers that the post assessment p-values are not influenced by the educational status of the patients. The significant p-value of the "Group- Between subjects" infers that the emotional functions of the two groups are statistically different even after controlling with the initial effects of the variables – education and pre assessment level.

Since only two post assessments, and there is no much difference exists in the significance level of the within subjects comparisons, it has not been discussed in detail.

To conclude, the intervention is much effective in improving the Role limitation emotional functions of the CABG patients.

Quality of Life- Vitality

Table No 4.41

Mean and SD of vitality of experimental group CABG patients by assessment.

QOL-Vitality	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	37.00	16.537	108.927	<0.001**	Pre vs post1	77.545	<0.001**
Post Assessment1	55.76	11.828			Post1vs post2	202.814	<0.001**
Post Assessment2	71.74	10.020					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.41 shows the mean and standard deviation of the vitality function of the experimental group CABG patients. The results are clearly infers that the intervention has been effective in improving the vitality function of the CABG patients.

Table No. 4.42

Mean and SD of vitality of control group CABG patients by assessment wise

QOL vitality	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	15.06	11.173	146.316	<0.001**	Pre vs post1	127.630	0.004
Post Assessment1	32.22	10.704			Post1 vs post2	178.504	<0.001**
Post Assessment2	41.46	11.484					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.42 shows the mean and standard deviation of the energy function of the control group CABG patients. The results of ANOVA repeated measure infers that in the control group also there is a significant increase in the vitality function of the CABG patients.

Figure No.4.6

Mean vitality value of the CABG patients by group and assessment

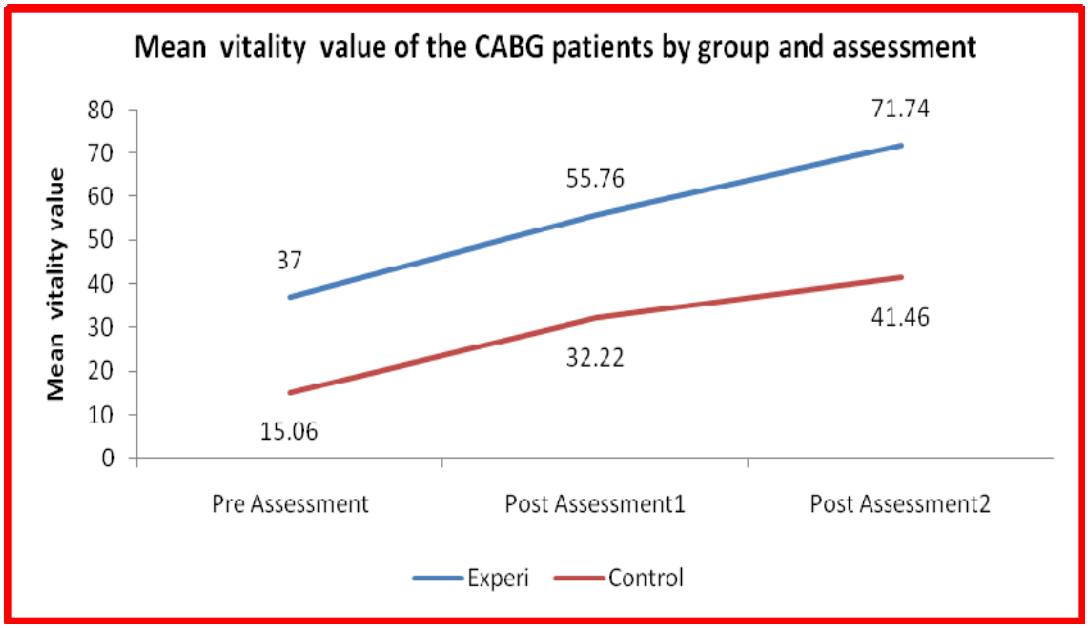


Figure No.4.6 shows the mean vitality values of the two group CABG patients at the three assessments. The diagram clearly shows the wide difference between the two groups from the beginning of the study. Hence, ANCOVA test has been preferred for the comparisons of the two groups.

Table No. 4.43

2X2 ANCOVA with last variable as repeated measure test result for vitality of CABG patients after controlling with pre assessment level and educational status

Source	F-value[#]	p-value
Between subjects		
Pre-Assessment	201.294	.001**
Educational	.092	.762
Group	69.180	.001**
Within subjects		
Assessment	68.394	.001**
Assessment * Pre Assessment	48.856	.001**
Assessment * Education	.652	.422
Assessment* Group	23.426	.001**

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.43 shows the 2X2 ANCOVA test result for the vitality function of the CABG patients. The result clearly shows there is a significant difference exists between the two groups after controlling with the initial effects of the covariates – education and pre assessment.

To conclude the intervention is much effective in improving the vitality function of the CABG patients.

Quality of Life- Emotional Well being

Table No. 4.44

Mean and SD of Emotional Well being of experimental group patients by assessment.

QOL-Emotional Well being	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	37.10	21.480	65.039	<0.001**	Pre vs post1	51.203	<0.001**
Post Assessment1	56.68	12.575			Post1 vs post2	122.581	<0.001**
Post Assessment2	72.96	9.924					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.44 shows the mean and standard deviation of the well being of the experimental group patients at the three assessments. The significant p-value of the ANOVA test with repeated measure infers that the intervention is effective in improving the Emotional well being status of the CABG patients in the two post assessments.

Table No. 4.45

Mean and SD of Emotional Well being of control group patients by assessment

QOL-Emotional Well being	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	18.72	16.505	165.246	<0.001**	Pre vs post1	152.371	0.004
Post Assessment1	36.32	17.990			Post1 vs post2	70.278	<0.001**
Post Assessment2	43.00	17.299					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.45 shows the mean and standard deviation of the Emotional well being of control group patients by assessment wise. The results of the statistical test infers that there is an improvement in the Emotional well being status of the control group CABG patients also.

Figure No. 4.7

Mean Emotionalwell being value of CABG patients by group and assessment

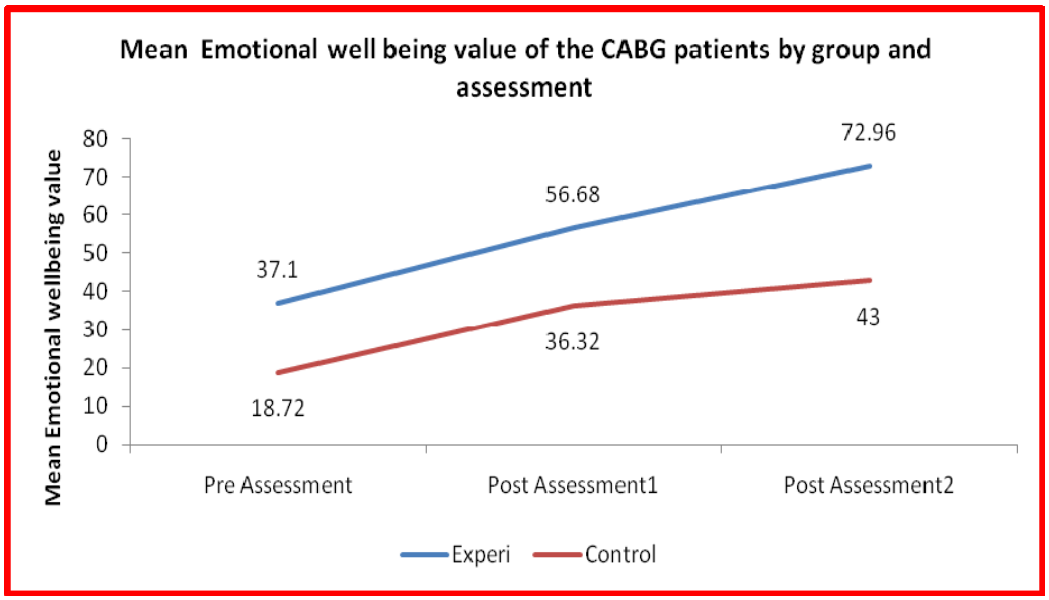


Figure No.4.7 shows the mean well being value for the two group CABG patients at the three assessments. The line diagram clearly indicates well being status has been higher for the experimental group patients than the control group patients. Since the initial values are statistically different for the two groups (Table no.3), ANCOVA test has been applied for the comparisons of the two groups.

Table No. 4.46

2X2 ANCOVA with last variable as repeated measure test result for Emotional Well being of CABG patients after controlling with pre assessment level and educational status

Source	F-value[#]	p-value
Between subjects		
Pre-Assessment	80.148	.001**
Educational	.142	.707
Group	48.434	.001**
Within subjects		
Assessment	35.033	.001**
Assessment * Pre Assessment	45.843	.001**
Assessment * Education	4.032	.048
Assessment* Group	70.243	.001**

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No.4.46 hows the 2X2 ANCOVA test result of the CABG patients for the well being variables. The result indicates that the experimental group patients are having higher post test mean values than the control group patients after controlling with the initial differences of the two variables –Education and Pre assessment well being level.

To conclude, the intervention has been much effective in improving the Emotional well being status of the CABG patients.

Quality of Life- Social functioning

Table No. 4.47

Mean and SD of Social functioning of experimental group patients by assessment

QOL-Social functioning	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	40.98	23.479	76.945	<0.001**	Pre vs post1	64.174	<0.001**
Post Assessment1	60.56	16.408			Post1 vs post2	104.964	<0.001**
Post Assessment2	75.70	14.067					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.47 shows the mean and standard deviation of social functioning of experimental group CABG patients by assessment wise. The ANOVA result infers that after the intervention there is an significant increase in the social functioning of the CABG patients.

Table No. 4.48

Mean and SD of Social functioning of control group patients by assessment

QOL-Social functioning	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	28.50	20.129	128.313	<0.001**	Pre vs post1	139.582	0.004
Post Assessment1	51.24	19.095			Post1 vs post2	31.319	<0.001**
Post Assessment2	59.30	13.190					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No.4.48 shows the mean and standard deviation of the social functioning of the control group CABG patients. The ANOVA test result infers that there is an improvement in the social function level of the CABG patients in the two post tests.

Figure No.4.8

Mean Social functioning value of CABG patients by group and assessment

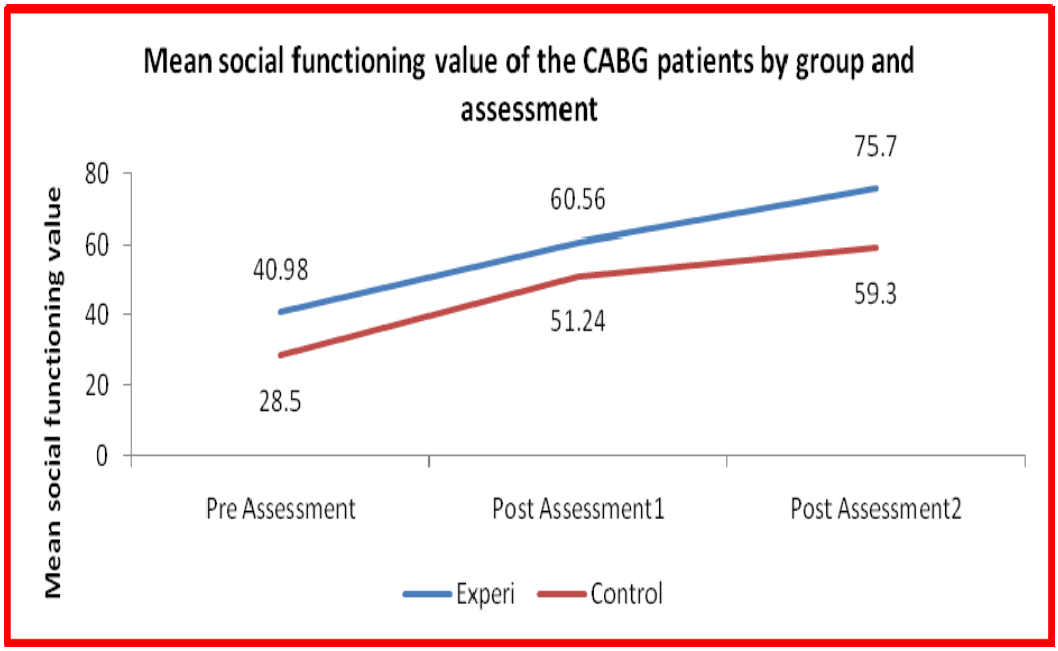


Figure No.4.8 shows the mean social functioning values of the CABG patients by group and assessment wise. For the experimental group patients the mean social function values has been higher than the control group patients. To verify whether the difference is statistically significant, ANCOVA test has been applied.

Table No.4. 49

2X2 ANCOVA with last variable as repeated measure test result for Social functioning of CABG patients after controlling with pre assessment level and educational status

Source	F-value#	p-value
Between subjects		
Pre-Assessment	145.411	.001**
Education	2.771	.100
Group	8.876	.004
Within subjects		
Assessment	113.709	.001**
Assessment * Pre Assessment	104.472	.001**
Assessment * Education	1.030	.313
Assessment* Group	35.246	.001**

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.49 shows the results of the 2X2 ANCOVA test result of the CABG patients for the social functioning variable. The result of the test infers that the social functioning of the CABG patients at the two post tests has been higher in the experimental group than the control group patients after the controlling with the covariates effects.

To conclude the intervention has been much effective in improving the social functioning of the CABG patients.

Quality of Life- pain recovery

Table No. 4.50

Mean and SD of pain recovery of experimental group patients by assessment

QOL- Pain recovery	Mean	SD	ANOVA Repeated measure test result[#]		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	38.24	16.560	136.425	<0.001**	Pre vs post1	111.564	<0.001**
Post Assessment1	56.52	15.462			Post1vs post2	174.527	<0.001**
Post Assessment2	70.54	16.885					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.50 shows the mean and standard deviation of the quality life of pain recovery function of the experimental group patients. The ANOVA test result infers that the intervention is effective in improving the pain recovery of the CABG patients.

Table No. 4.51

Mean and SD of pain recovery of control group patients by assessment wise

QOL- Pain recovery	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	31.08	9.949	269.433	<0.001**	Pre vs post1	447.415	0.004
Post Assessment1	53.06	11.345			Post1vs post2	42.839	<0.001**
Post Assessment2	61.54	9.407					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.51 shows the mean and standard deviation of the quality of life of pain recovery function of the control group patients. The significant p-value of the ANOVA repeated measure test infers that the mean pain recovery function level has been highly increase at the endof the posttest2 for the control group CABG patients.

Figure No.4.9

Mean pain recovery level of the CABG patients by group and assessment

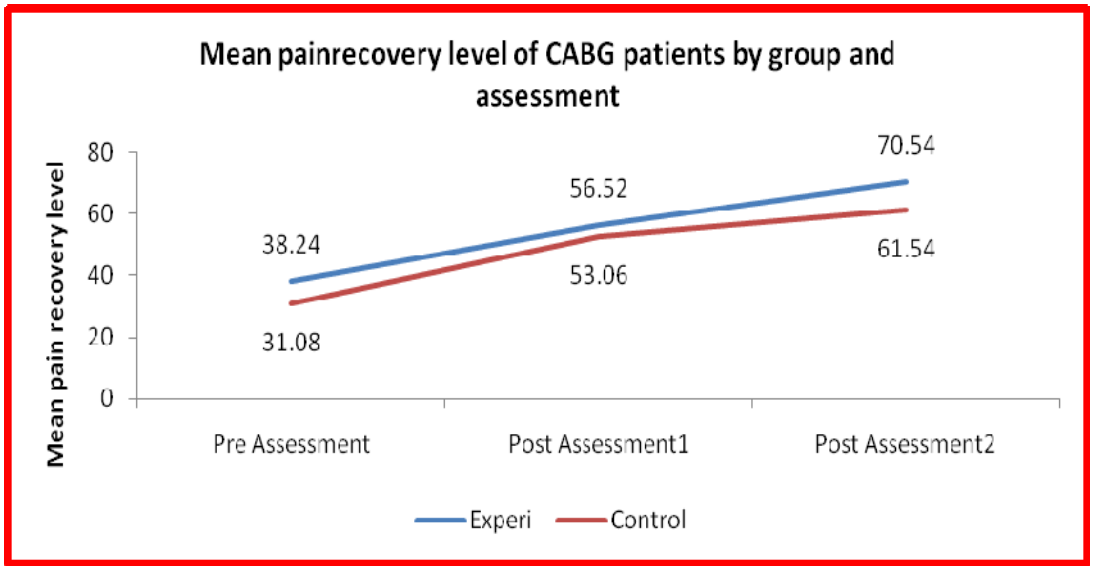


Figure No. 4.9 shows the mean pain recovery function level of the CABG patients for the two groups at the three assessments. Though the experimental group patients are having higher mean pain function level compared to the control group patients, the difference has been minimal only. To verify the difference the ANCOVA test has been applied.

Table No 4.52

2X2 ANCOVA with last variable as repeated measure test result for pain recovery of CABG patients after controlling with pre assessment level and educational status

Source	F-value#	p-value
Between subjects		
Pre-Assessment	87.426	.001**
Educational	.056	.813
Group	.034	.855
Within subjects		
Assessment	119.644	.001**
Assessment * Pre Assessment	82.181	.001**
Assessment * Education	2.914	.091
Assessment* Group	21.268	001

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.52 shows the 2X2 ANCOVA test results for the pain function variable. The non-significant p-value of the "Group" comparison infers that there is no significant difference exists between the experimental group and control group patients at the two post tests after controlling the initial influence of the pre assessment level for the pain function variable.

To conclude, there is no significant difference exists between the experimental and control group patients.

Quality of Life- General Health

Table No.4.53

Mean and SD of general health of experimental group CABG patients by assessment

QOL-general health	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	51.22	8.05	211.505	<0.001**	Pre vs post1	161.594	<0.001**
Post Assessment1	65.24	8.14			Post1 vs post2	151.123	<0.001**
Post Assessment2	72.40	8.97					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.53 shows the mean and standard deviation of the general health function of the CABG patients. The significant p-value infers that the intervention has been effective in improving the mean general health function of the experimental group patients.

Table No. 4.54

Mean and SD of general health of control group CABG patients by assessment

Qol -General health	Mean	SD	ANOVA Repeated measure test result#		Repeated Contrast test result		
			F-value	P-value	Comparison	F-value	P-value
Pre Assessment	47.50	12.58	75.599	<0.001**	Pre vs post1	79.476	0.004
Post Assessment1	59.96	8.10			Post1vs post2	18.409	<0.001**
Post Assessment2	62.66	7.00					

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.54shows the mean and standard deviation of the general health function of the control group patients by assessment wise. The result of the ANOVA test reveals that there is an significant increase in the mean general health function of the control group patients.

Figure No. 4.10

Mean general health function value of the CABG patients by group and assessment

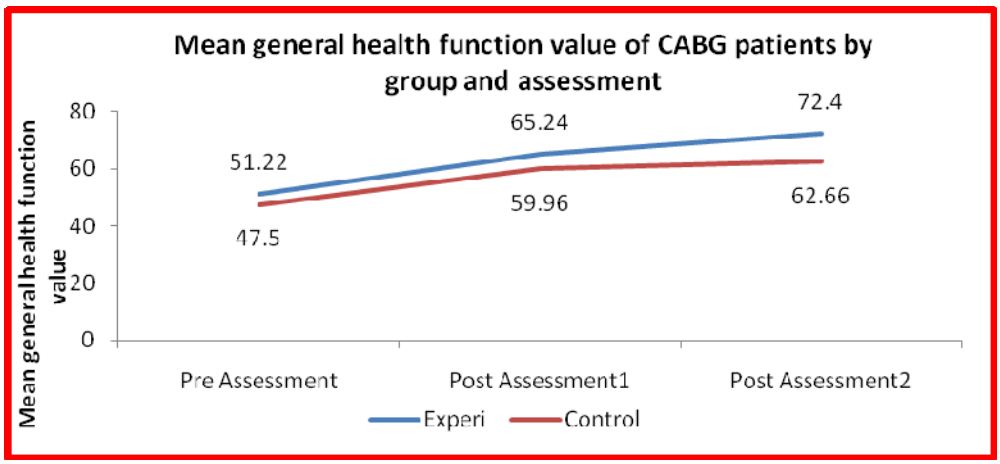


Figure No.410 shows the mean general health function of the CABG patients by group and assessment wise. The line diagram clearly infers the experimental group patients are having higher general function value than the control group patients. Since the initial pre assessment values are different for the two groups(Table no.3), ANCOVA test has been applied.

Table No.4. 55

2X2 ANCOVA with last variable as repeated measure test result for general of CABG patients after controlling with pre assessment level and educational status

Source	F-value[#]	p-value
Between subjects		
Pre-Assessment	55.201	.001**
Education	.741	.392
Group	15.372	.001**
Within subjects		
Assessment	32.899	.001**
Assessment * Pre Assessment	26.295	.001**
Assessment * Education	.110	.740
Assessment* Group	30.185	.001**

Since SD has been large, test has been applied for logarithmic values

P<.001** highly significant

Table No. 4.55 shows the 2x2 ANCOVA test result for the general health function variable. The result infers that post test mean general health function values has been different between the experimental and control group patients after the controlling with the covariates effects.

To conclude, the intervention has been effective in improving the general health function of the CABG patients.

SECTION – IV

Table No 4.56

Correlation between activity tolerance scores and Quality of life scores of the CABG patients in experimental group in post test by Karl Pearson correlation method

N = 50

Quality of life components	Activity tolerance Post test I	Activity tolerance post test II
	'r' (karl pearson correlation)	'r'(karl pearson correlation)
Physical functioning	0.001**	0.001**
Role Limitation physical	0.235#	0.245#
Role limitation Emotional	0.245#	0.247#
Vitality	0.126#	0.073#
Emotional wellbeing	0.579#	0.731#
Social functioning	0.704#	0.567#
Pain recovery	0.393#	0.570#
General Health	0.388#	0.749#

- Not significant P<0.001** Highly Significant

To find out correlate between activity tolerance of the experimental group who received cardiac rehabilitation programme and their quality of life null hypothesis stated as follows.

Ho7:

There will be significant negative correlation between activity tolerance scores of the experimental group who received cardiac rehabilitation progarmme and their quality of life.

Table No 4.56 reveals that, there is a significant correlation between quality of life physical functioning and activity tolerance.

Therefore, the researcher rejects null hypothesis and accepts research hypothesis.

The other Quality of life scores as follows

Role limitation physical scores in post test I & II .235 &.245

Role limitation emotional scores in post test I & II .245&.247

Vitality scores in post test I & II .126&.073

Emotional wellbeing scores in post test I &II .579&.731

Pain recovery scores in post test I&II .393&.570

General health scores in post test I&II .388&.749 which is not significant at .05 level.

So the researcher rejects research hypothesis and accepts null hypothesis.

Table No. 4.57

Correlation between physiological parameters (Heart Rate) scores and Quality of life scores of the CABG Patients in experimental group in the post test by Karl pearson correlation method

N = 50

Physiological Parameters	PF		RL		R E		Vitality		EW		SF		Pain		GH	
	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2
HR:																
Post test I	.736#	.200#	.426#	.332#	.463#	.348#	.505#	.783#	.657#	.992#	.659#	.082#	.982#	.571#	.045#	.272#
Post test II	.911#	.282#	.392#	.295#	.514#	.430#	.783#	.823#	.483#	.856#	.615#	.082#	.895#	.526#	.062#	.254#

= Not Significant

Ho 8:

To correlate mean post test scores of physiological parameters (Heart rate) scores of CABG patients in experimental group who received cardiac rehabilitation program and their quality of life. Null hypothesis is stated as follows. There will be significant correlation between heart rate & their quality of life.

Table No 4.57 reveals that there is no significant correlation between physiological parameters (Heart rate) and quality of life. So the researcher rejects research hypothesis accept null hypothesis.

Table No 4.58

Correlation between physiological parameters (ECHO EF Scores) and Quality of life scores of the CABG patients in the experimental group in post test by karlpearson correlation method.

N = 50

Physiological Parameters	PF	RL	RE	Vitality	EW	SF	Pain	GH
Post test	0.297#	0.377#	0.422#	0.208#	0.284#	0.025*	0.082#	0.193#

- Not Significant P < 0.05* significant

Ho8:

To correlate mean post test scores of physiological parameters ECHO EF scores of CABG patients in experimental group who received cardiac rehabilitation program and their quality of life. The null hypothesis stated as follows.

Table No 4.58 reveals that there is a significant correlation between social functioning scores with ECHO (Ejection fraction score). So the researcher rejects null hypothesis and accepts research hypothesis.

The other QOL post test scores as follows:

Physical functioning .297,Role limitation physical .377, Role limitation emotional .422,Vitality .208,pain .082,General health .193 which is not significant at .05 level .So the researcher rejects research hypothesis and accepts null hypothesis.

CHAPTER – V

DISCUSSION

This chapter presents the discussion part of this study according to the results obtained from statistical analysis correlated with the existing literature, objectives, hypotheses and findings of the study.

The study is mainly concerned with the effectiveness of cardiac rehabilitation programme on activity tolerance, physiological parameters (HR, ECG) and quality of life among CABG patients at Government Rajaji Hospital, Madurai.

With a view to gain the objectives of this study, a quantitative approach with the quasi experimental non equivalent pre test post test control group design has been utilised. Total enumerative sampling procedure is implemented to select samples. The data have been collected from 100 CABG patients, 50 for the experimental group and 50 for the control group. The data are collected and analysed. The variables of the study are activity tolerance, Physiological parameters (Heart rate ,ECG,ECHO) and quality of life.

Demographic characteristics of CABG Patients

Age:

In the experimental group, 42% were between 50-59 years and in the control group , 44% were in the age group of 40-49 years.

Sex:

With respect to sex , majority of them were males in both experimental group (94%) and (92%.) in the control groups . Only about 6% and 8% of them were female

in the intervention and the control group , respectively. The present findings are consistent with the study findings of National Institute of Health incidence and prevalence[145] . Prevalence rates are high with age and are greater for men than women.

Yet another study done in Australia reported that male and female ratio is consistent with demographic parameters of the cardiovascular disease mainly affecting men ,with CABG surgery performed three times more in males compared to females[146].

Education:

In the case of experimental group, 50% of them were educated upto primary level and in the control group, 76% had primary education.

Religion:

Majority were Hindu by religion in both the experimental group, 88% and in the control group 92%. .

Presence of Co morbid condition:

About Co morbid condition, in the experimental group history of Diabetes mellitus is found in 22%, and both diabetes mellitus and Hypertension were seen in 28%, in the control group, diabetes mellitus is present in 28%, and both diabetes mellitus and Hypertension were found in 32%.

The current study findings allign with the INTERHEART study[8] conducted globally which identified risk factors for Heart attack. Hypertension and diabetes were found to be the major causes of primary cardio vascular attack. .

A retrospective Study of patients is conducted by Achari and Thakur[147] in Delhi to identify association of major changeable causative factors among subjects with CAD. A total of 5748 CAD patients with 4952 males and 796 females were taken from the hospital records for analysis along with 8103 in the control group (6092 males & 2 011 females). . Hypertension is the causative factor in1036 subjects [18.02%] and diabetes in 763 [13.28%] . Among the risk factors, smoking, hyper tension and diabetes were associated with CAD.

Presence of Unhealthy Habits:

In the experimental group, 38% of them had the habit of smoking and alcoholism .It is 42% in the control group.

The study conducted by Aggarwal[14] etal identified changeable risk factor among 292 subjects and concluded that smoking(74.3%) is a changeable risk factor. This factor also supports the present study.

The study conducted by Achari and Thakur[147] identified that smoking is one of the major risk factors for coronary heart disease. Smoking is significantly more common , when it is compared with the subjects without coronary heart disease [P<0. 001]

Food Habits:

With regard to food habits, 92% of the experimental group and 88% of the control group were consumers of non vegetarian food occasionally.

This implies that non vegetarian food habits create more chances of CAD than vegetarian food habits.

Number of Vessels Blocked:

Majority of the subjects in the experimental group 86% and 84% in control group had triple vessel disease for which they had undergone CABG. The findings of the present study are supported by the statement of Keogh and Kinsman, "Most of the CABG surgery will be performed, if the subject has triple vessel disease[148] .Another study conducted by Fatima Direk with the aim of assessing postoperative complications among 53 patients who underwent CABG surgery in 2011 reported that .84.9 had triple vessel disease.[110]

Further, an angiographic Study done prior to surgery at vellore among 877 patients who underwent CABG showed that 55 % were with triple vessel disease.[149]

People who underwent CABG surgery are generally found to be people with triple vessel disease.

Heart Rate:

With regard to heart rate, 16% had tachycardia in the experimental group and 2% in the control group . Most of them had normal heart rate.

Heart rate is a physiological feature indicating the influence of the autonomous nervous system of heart .Analysis of heart rate is one of such indicators of autonomic nervous system activity.[150]

Blood Pressure:

In the experimental group, 36% had systolic BP above 130mmHg and 32% in the control group .Most of them had normal Blood pressure.

This implies that BP of the subjects of this study is controlled by appropriate drugs.

For the discussion to be more perceptive , the first two objectives of the study are discussed below.

1. To assess the pre test and post test activity tolerance, selected physiological parameters (heart rate, ECG) and quality of life of patients with CABG surgery in experimental and control group
2. To evaluate the effectiveness of cardiac rehabilitation programme in terms of activity tolerance, selected physiological parameters (heart rate, ECG) and quality of life of subjects with CABG surgery.

Activity tolerance

The mean activity tolerance scores of the samples in the experimental group improved from 14.84 ± 2.65 in the pretest to 18.52 ± 2.41 in the posttest I and 22.30 ± 3.32 in the posttest II .No such marked differences were noted in activity tolerance scores of the activity tolerance of the samples [Pretest(13.28±1.89) ,posttestI (14.80±1.94) and posttestII 15.70±1.60)]

Traditionally ,maximum oxygen consumption is a determiner for individual's physical and functional capacity. It is known that adequately planned intensity, time length and frequency of physical activities are the effective ways to improve vo2 max (maximum oxygen consumption).Maximum oxygen consumption is a good indicator of activity tolerance which reflects better cardiovascular and respiratory performance ,higher muscular blood flow and greater number of mitochondria involved in aerobic metabolism. [151 ,152 ,153] Certain studies done by Belardinelli etal, Ades, Ehsani, Leon

et al and Thompson as [151 ,153 -157] cited by American journal of medicine and medical sciences portray a 10-50% increase in vo2 max after cardiac rehab programme execution.

In the current study , there is a 6.33% increase in the maximum oxygen capacity (vo2) reported activity tolerance score between pre test and post test I (30^{th} day); and a 12 .82% improvement of the same between pre test and post test II(60^{th} day).This is very similar to the vo2 scores cited in the previous studies.

Further, it can also be inferred from that male CABG Patients belonging to the age group of 60-69 benefited more from the cardiac rehab programme than the other age group vividly portrayed in the improvement of the duke activity tolerance scores from low functional capacity(14.66) n the pre test to(22) fair functional capacity in the post test II. The same is applicable to female CABG patients where samples between 60-69 years improved from low functional capacity (13 in the pre test) to fair functional capacity (22 in the post test II).

In the current study, cardiac rehabilitation programme executed by the nurse researcher is found to be effective in improving the activity tolerance scores which have been vividly portrayed by the following results.

Post test 1 of experimental group vs control group (t=8.471;p=0.001) is significant .In post test II of experimental group vs control group(t=12.6;p= 0.001) is significant. Statistically significant improvements in the activity tolerance were noted among the pretest vs post testI(t=14.82 p=.001) and pretest vs post testII (t=15.682 p=.001) comparison of the experimental group. Interestingly, statistical parameters of the patients in the control group too improved significantly interms of

activity tolerance as noted in the comparision between pretest vs posttest I (t=14.62 p=.001) and pretest vs post testII comparision (t=21.80,p=.001).The reason could be attributed for the above improvement is that CABG surgery has been proved as an efficient surgical treatment for coronary heart disease. It not only reduces clinical signs of illness but also enhances exercise tolerance. The key change that has to be noted in the current study is the maximum oxygen capacity (vo2)between the samples in the control and the experimental group. The samples in the experimental group had 6.33% increase of vo2 between pretest and post test 1(30 th day) whereas it is only 2.76% in the control group . Similarly, there is 12% increase for the experimental group between pretest and post test II (60th day) as against 4.17% for the control group. This clearly illustrates that patients who had undergone cardiac rehabilitation after CABG surgery benefited more interms of activity tolerance than who underwent CABG surgery alone without cardiac rehabilitation

But in both the group comparisons there are significant changes in activity tolerance .For controlling confounder variables ANCOVA (Analysis of covariance) is used. Confounders were education and pretest assessment. After adjusting confounders ,comparison of adjusted two mean groups again remained significant for activity tolerance($p<.001$,$p<.001$).Repeated measure Anova results proved that intervention is much effective in improving the activity tolerance of the CABG patients.

The goal of the CABG procedure is to decrease signs of illness relevant with CAD such as a chest pain, breathing difficulty, increasing in the patient's quality of life and decreasing the occurrences of chest pain[158]

Patients who underwent CABG surgery generally feel weak on discharge . These subjects should be ambulatory. However, soon after they return home, recovery occurs in 4-6 weeks and gradually there is increasing ambulation and activity. Patients who involve in heavy physical work may need to wait 3-6 months after discharge, to allow sternum to heal completely[159] . Exercise intolerance is the result of reduction in cardiac output which is due to impaired myocardial function[160].

The significant improvement in the activity tolerance of control group is vivid due to the CABG surgery and is further validated by a cross sectional study conducted by Po-chin strong [161] .It associated in Taiwan among 102 patients, all of whom had undergone CABG surgery. Pearson correlation coefficient demonstrated a significant association between WHO QOL BREF scores and peak oxygen uptake in the physical domain of QOL. This may be the result of the relief of angina symptoms and improvement in aerobic capacity, which restricted the patient's lives before surgery.

Cardiac rehabilitation has been effective in improving the activity tolerance and is well supported by following studies. Changes that happen during exercise increase stroke volume thereby, increase myocardial contractility and ventricular volume increase. Further, it increases cardiac output. Increased cardiac output increases maximum oxygen uptake and results in greater increase of the delivery of oxygen to the working muscles[162] .

Dr.Rajendran etal,[138] of Apollo Hospital, Chennai, (2004) evaluated the effectiveness cardiac rehabilitation programme in CABG surgery patients. The research is conducted in a hospital environment comprising 74 subjects with a CABG

surgery. Results showed that there is a desirable alteration in functional capability (11.4 + 1.59 METS).

A retrospective analysis is carried out by Kennedy etal[117] in Northern Alberta, America in 2003 to identify the impact of a complete cardiac rehabilitation programme on quality of life and exercise acceptance among 126 women. The study concluded with the notion that marked improvements were established in the quality of life after cardiac rehabilitation program in physical dimension and behavioural dimension. Major Progress is monitored in exercise tolerance (+21%)

Taylor etal[119] studied the exercise acceptance and quality of life after cardiac rehabilitation with 8940 old age subjects after myocardial infarction in Wisconsin in 2003. Cardiac rehabilitation and home CR are same and efficient within three months recovery period. It increases Total Work Capacity (TWC)and Health Related Quality of life(HRQL) in all ages.

A study was conducted at North Eastern University, Boston (2010) by Dinon[121] to identify the Efficiency of a Three Month Cardiac treatment Program on Cardiovascular stamina .In conclusion, this three-month cardiac rehabilitation program improved exercise endurance and the Physical Component Score(PCS) of the Short form(SF-12) of participants after a recent uncomplicated heart attack.

Nurses play an important role in improving activity tolerance. After CABG surgery, stretching activity should be taught to the patients. It should be gradually increased to their tolerance level .Nurses need to teach essential aspects of exercises in inpatient unit bridging the home care to increase further activities.

Physiological parameters

a. Heart rate

Physiological parameters such as mean heart rate score of experimental group improved from pretest 89.38 ±11.54 in the post test I 87. 20 ± 8.75 and in the posttest II 87.64± 8.51.But, incase of experimental group it has reduced 2 beats per minute. But ,the heart rate scores of control group samples are [pretest (87.72 ± 6.29),post test I (86.72 ±5.81) post test II (87.74 ± 53)] .

Interms of heartrate scores as noted in the comparison between Pretest vs posttest I in experimental group (t= 4.13 p=.001) and pretest vs posttest II comparison (t= 2.77 p= .008) shows significant changes at .01 level.Interms of heart rate scores as noted in the comparison between pretest vs posttest I in control group (t= 3.03 p= .004) shows significant changes at .01 level and pretest vs posttest II comparison (t= .73 p= .467) does not show significant changes.

Comparison of posttest between experimental vs control group

The mean post test level of heart rate scores of the intervention group post test 1 (87.20) and post test 2 (87.64) are greater than the mean post test score of control group post test 1 (86 .72) and post test 2 (87.40). The obtained 't' values of post test 1 (.323) and post test 2 (0. 169) are not statistically significant(at 0.01 level). For controlling confounder variables ANCOVA (Analysis of covariance) is used. .The significant confounders were education and pretest assessment. After adjusting for the effects of confounders comparison of adjusted mean groups, again not remained the same in heart rate scores. The non significant P value infers that ,the intervention has no influence on the heartrate of the CABG patients.

The present findings contradict with the findings of McNally & Mares [124] who evaluated the effectiveness of CR on Heart Rate Variability (HRV) subsequent either Cardiac bypass surgery (CABG) or Percutaneous Coronary Intervention (PCI) . The research denoted that a 45days of CR program benefited all subject groups with cardio respiratory utility following autonomic nervous system inflection of heart rate. CABG subjects viewing the main progress of HRV is a helpful to add variable to measure cardiac function following CR .

Another study is done to assess the benefit of a CR programme of cardio vascular and exercise parameters in patients with type 2 DM. Data were collected respectively from 1316 consecutive patients[Diabetic= 361 with Non-diabetic =955] who underwent CABG and were enrolled in an exercise based rehab programme The main outcome measures were significant improvement in heart rate recovery after attending cardiac rehab programme. [163] .This study also contradicts the present findings.

The present findings are supported by the following concept

According to a Biomed Central Article, heart rate variability is a physiological feature which indicates the influence of the autonomic nervous system on the heart rate. Association of the reduced heart rate variability due to myocardial infarction and the increased post infarction mortality is first described more than thirty years ago. Many studies have unequivocally demonstrated that coronary artery bypass grafting surgery generally leads to significant reduction in heart rate variability, which is even more pronounced than after myocardial infarction. Pathophysiologically, however, the mechanisms of heart rate variability reduction associated with acute heart attack and coronary artery bypass grafting are different. Generally, heart rate

variability gradually recovers in the preoperative values within six months of the procedure[150].

This implies that CABG has no impact on Heart rate variability. This has been proved by the present study.

1. 1.It is clear that, in most of the subjects who underwent CABG surgery, Heart Rate Variability (HRV), reduces with progressive improvement within a short period of months, after the surgery.
2. 2. According to the results of this study it is suggested that subgroup of subjects with reduced HRV a few months later to CABG surgery require vigilant follow up, diagnostic evaluation, larger usage of follow up medicines with a well-recorded favourable benefit of HRV and subject desirable results,[164, 165 - 171].
3. It is important to conduct researches in a wider range of subjects, in order to acquire additional knowledge, and make definitive the prognostic value of post-CABG HRV.

b. ECG-ST Depression Scores

Physiological parameters such as, the mean pre test ECG -ST Depression score of experimental group improved from 3. 95 ± 22 in the pre test to 1.3 5±4 8 . No such marked difference is noted in the ST Depression scores of control group samples pre test(3. 7 ± 47) to post test 2. 00 ± .32) Interms of ECG-ST Depression scores as noted in the experimental group, comparison between pretest vs posttest (t= 18.42 p= .001) shows significant changes. Interms of ECG-ST Depression noted in the control group comparison between pretest vs posttest (t= 9.20 p= .001) shows significant changes.

Comparison of posttest between experimental vs control group

There is a significant change noted between posttest experimental vs control group comparison (t= 6.568 p= .001) .It proves that intervention is effective in reducing the ischaemia in CABG patients.

According to the book reviews and expert opinion , scoring has been interpreted for both ECG ST Depression and ECHO Ejection Fraction.

Increase of ST Segment depression has been found between> . 05 mili Volts between v5-v6 leads which led in subjects with a particular response to prior revascularization. ST-segment depression has been counted as present, if it is horizontal or down-sloping . Inverted T wave(s) has been counted as present, if the T wave is isoelectric, negative or biphasic in leads[172] .

Normally ,after CABG surgery, ST segment depression reduction from 4mm to upto. 5mm is a good prognostic value. It is a physiologic change of revascularization .Upward sloping ST Segment is considered to be monitored in ECG rhythm at v6-v5 leads[173] .

The study findings are supported by following study

Diderholm etal [174] studied the benefit of prior revascularization and also the amount of coronary lesions changes in ST segment and T wave modifications among 2457 subjects with unstable coronary artery disease patients. Out of this ,1114 patients were identified with ST depression. Patients were classified into surgical and non surgical group . In surgical group, 45% had ST segment depression with triple vessel block or left main disease and in non surgical group, 22% of CAD Patients were identified . The study concluded that in unstable

coronary artery disease, ST-segment depression above 4mm combined with a 100% increase provides the chances of three-vessel/left main disease and to an higher risk of following cardiac events. In these subjects, cardiac surgery significantly lowers death .Knowledge of these risk factors is useful in detection of atherosclerosis .Nurses play an important role in reducing reintervention.

A study is conducted by Inci[175] etal among 2000 patients who had coronary angiography to determine the predictors of reintervention in patients with symptoms of recurrent CABG between 2003-2010 in Turkey. Reintervention is common in DM, HT, family history of CAD ,ECG changes ,positive troponin level, elevated CKMB,EF>50 and in smokers p<..05. Reintervention is higher in patients with ECG changes and normal EF.ECG changes ST segment depression and is an important predictors of reintervention. The study concluded that reintervention after CABG above 4mm especially higher in patients with riskfactors of atherosclerosis and those who have ECG changes.

The research is conducted by Clasmmheimen etal [176] to enquire whether Spinal Cord Stimulation (SCS) could be utilised as an another way to Coronary Artery Bypass Grafting (CABG) in certain patient groups, that is, patients with no prognostic use from CABG along with a high risk of surgery. The research is done to evaluate ST Depression on CABG patients. In this study, 53 patients were randomized and assessed with ischemic ECG. It changed in the course of physical activity, before and 6 months after the CABG surgery. The CABG group had low ST-segment depression on maximum (*P*=.005). The study concluded *that* CABG is a method in terms of symptom relief in this group of patients.

Mc Leod [177] assessed the impact of cardiac rehabilitation after CABG surgery and its effect of ischaemia among 150 patients for 2 months. Results showed improvements in indices of ischaemia. ST Segment shift is not further affected by cardiac rehabilitation.ST Depression mean pre surgery are 1.2 +.2 mm and post surgery rehab .2+.1mm. Decreasing ST Segment depression is one of the prognostic signs .Cardiac rehabilitation helps to attain faster recovery of ST Segment changes. Nurses have an essential part in providing knowledge to subjects about risk factors of atherosclerosis in ST depression changes in cardiac rehabilitation.

The objective of the study done by Darin glyten etal [178] is to evaluate the effectiveness of the ECG changes in post CABG patients during cardiac rehabilitation program and also to find out whether it is usual in other subjects too. The eligible 618 patients (71% male) were available for analysis. ECG ischemia is defined as ST segment depression above 1 mm 80 msec after the J-point with normal QRS complex. Of the eligible subjects, 137 (25.75%) had undergone CABG surgical procedure. Of those, 17 (12.4%) displayed ECG ischemia for a minimum of one time during CR compared with 76 (19.2%) of all others. Further, evaluation or admissions recommended for additional surgical procedure happened for 2.5% and 4.1% respectively, for the non-CABG subjects and 0% and 2.2%, respectively for the CABG subjects. The study concluded that through Phase II CR, ECG symptoms pointing to ischemia happened in 12.4% subjects with CABG and 19.2% of all other subjects.

Nurses play an important role in improving the activity tolerance thereby , improving the recovery. Cardiac rehabilitation plays a major role in faster recovery process.ST Segment depression is one of the ways to identify improvement.

c. Echo Ejection fraction scores

The physiological parameters such as the mean Ejection fraction scores in the experimental group improved from pre test (49.52 ± 10.50) to posttest(51.62± 9.88) and No such marked difference is noted in the scores of control group samples(pretest(49.38±8.32) and post test(49.80 ± 8.67) . The statistical parameters of patients in the experimental group between the pretest and post test comparison (t=3.185 p=.001) is significant. Incase of control group, pretest vs posttest comparision (t=.582 p=.563) is not significant.

Comparison of Posttest effects Echo-ejection fraction scores between groups

The mean posttest ejection fraction scores of experimental vs control group t=.979 p value .330 which is not significant at . 01 level.

The findings are supported by this concept

Ejection fraction is the monitoring of the blood coming out of the heart at every contraction. Cardiac rehabilitation programmes often will note improvements in patients with ejection fraction. For many, through building structured exercise, they can improve the muscular strength of their body and thus reducing the effort of the heart to work to meet the demands for oxygenated blood. Exercise does improve the ejection fraction in many studies, but, if it doesn't still improve the functional ability and quality of life of most individuals. Cardiac Rehabilitation programs often will note an improvement in patients ejection fraction. It is usual that echo cardiogram changes happen approximately after three months of surgical procedure . It also gives time to the heart to recover and medical management to be fully effective, and this depends upon how long a cardiac rehabilitation program lasts. The cardiac

rehabilitation programme encourages them to increase their workloads as their ejection fraction is likely to increase and patients can feel safe pushing the intensity

When the heart beats, it contracts or squeezes and then relaxes. During contraction, the heart pushes the blood into the ventricles out. During the relaxation phase, the pumping chambers are refilled with blood. Irrespective of the force involved in the contraction, the blood in the ventricles is not completely emptied. The word "ejection fraction" denotes the amount of blood that is contracted out of the ventricles in each beat of the heart. An usual LV ejection fraction is 55 to 70%. The ejection fraction reduces due to an angina, leading to the damage to the cardiac muscle as a result of which the heart cannot contract by force, the function of heart valves is improper, unmonitored high blood pressure for chronic periods and weakness of the cardiac muscle, like dilated cardiomyopathy[125] .

The study findings supported by the following study

Subjects with CABG surgery, about 145 in number with a left ventricular ejection fraction LVEF 50 % of 145 patients were included in this research to examine modifications after CABG surgery. In this study, LVEF by routine echo cardio graphy is not remarkably altered following surgical procedure in all groups in the 180 days follow up[179] . LVEF and stroke volume were measured .LVEF did not change during 6 months follow up.

Echo-Ejection fraction changes help to know the changes after CABG surgery. Cardiac Rehabilitation Programme helps to attain these improvement in ejection fraction scores.

Quality of life scores

According to SF36 Questionnaire, Quality of life has 8 Dimensions.

QOL-Physical functioning scores

The mean QOL physical functioning scores of experimental group improved from and (46.60+ 24 .27) in the pretest to Post test 1(63+17.14) and posttestII (79+15.41). In the experimental group , there are significant changes in the post test (p value .001) level.

The mean QOL-Physical functioning scores of control group improved from (28.500±23.21) in the pretest to (37.7±16.91) in the posttest I and in the posttest II(47.3±15.53). In control group there are significant changes in the post test (p value at . 01) level .

Comparison of posttest QOL-Physical functioning scores between experimental vs control group

Mean physical functioning scores in the experimental group in post test 1 (63) and post test 2 (79) were higher than the mean post test score of control group post test 1 (37.7) and post test 2 (47.3). The obtained 't' values of post test 1 (7.43) and post test 2 (10.230) are statistically significant at 0.0 01 level .Repeated measure anova results proved that intervention is much effective in improving the physical functioning of the CABG patients.

CABG surgery is one of the most frequently performed surgical procedures. Supervised exercise programmes have been recommended to facilitate recovery immediately after surgery .The goals of these programme are to prevent detrimental effects of prolonged bedrest ,to enhance cardiac function, to improve physical

tolerance and skills for the basic activities of daliy life and to strengthen self confidence with the ultimate aim of reducing the length of stay[180]

When compared to the mean post test values of physical functioning in the experimental group I&II , it is significantly higher than the control group . So, physical functioning scores had improved in the case of experimental group than control group.

Coronary revascularization by CABG surgery is likely to improve the dynamic state of Oxygen transport during exercise and other measures of aerobic function reflecting improved exercisetolerance[181] .

It has been reported that stroke volume and leftventricular ejection fraction de crease after a myocardial ischemia whichdevelops during exercise in patientswith cor onary stenosis. Physical fitness , being utmost important to a cardiac patient, is improved with the help of consistent physical activities and physical training. Data obtained from a study show that indulging in physical activity training increases the exercise capablity, peripheral hemo dynamics, endothelial and autonomic functions and quality of life. It reduces depression and anxiety and enhances psychosocial well-being .Further more , it decreases the chance of reoccurrence of heart disorders. For a period of 3-6 months, monitored physical activity training is found to improve the peak oxygen intake of the subject from 11% to 36%. A great deal of improvement is discovered even in the subjects who are deconditioned. Experiment found out that the Cardiac Rehabilitation(CR) programme carried out at individualized level to improve ventilatory efficiency remarkebly increases the aerobic physical capabilities of all

heart disorder subjects, and induces the same positive outcomes irrespective of the age, sex or heart pathology[182] .

QOL-Role limitation physical

QOL role limitation physical scores of experimental group improved from (43.00 ±40.06) in the pretest to (48 .6 ± 35.97) in the Posttest I and posttest II (56.6 ±30.48) . In the experimental group ,there were no significant change in the posttest p value at .0 1 level.

The mean QOL -Role limitation physical score of control group improved from (27.12±23.98) in the pretest to (34. 22 ± 24.14) in the posttest 1 and posttest II (48.20 ± 24.63) In control group , there were no significant changes at(.0 1level) . In both the group, Role limitation physical component does not show significant changes.

Comparison of posttest QOL-Role limitation physical scores between experimental vs control group

Role limitation physical scores in experimental group in post test 1 (48.46) and post test 2 (56.66) were higher than the mean post test scores of control group post test 1 (40.7) and post test 2 (48.2). The obtained 't' values of the post test 1 (1.200) and post test 2 (1.500) are not statistically significant at 0.0 1 level. Repeated measure anova concluded ,the intervention is similar to the control group with respect of role limitation physical function of the daily activities.

QOL-Role limitation emotional

The mean QOL role limitation emotional in the experimental group improved from (40.69±43.66) in the Post test 1 (48 .60 ±35 .97) and posttest II

(6 1.24±32 . 23). In the Experimental group, significant change is noted in the posttest I p value at . 01 level .But ,there is significant changes in the posttestII p value at .001 level. The mean QOL scores in the control group improved from (27. 12± 23.98) in the pretest to (34. 22±24.14) in the posttest I and posttest II (39.12±22.74).In the control group, there is no significant change in posttestI and II p value obtained at .01 level

Comparison of posttest QOL-Role limitation emotional scores between experimental vs control group

Role limitation emotional scores in experimental group in post test 1 (48) and post test 2 (6 1) were higher than the mean post test score of control group post test 1 (34.2) and post test 2 (39.12). The obtained 't' values of post test 1 (2.350) and post test 2 (4.200) were statistically significant at 0.0 01 level. Repeated measure anova proved that,the intervention is much effective in improving role limitation emotional function of the CABG patients.

Relaxation therapy is therefore effective as an adjunct to medical care as well as standard cardiac rehabilitation. This is confirmed by systemic review & meta analysis done by JanvanDixhoorn and Adrian white and that established the overall contribution of stress management and psycho social education for cardiac patients. It is an important ingredient of cardiac rehab in addition to exercise and psycho education.

Stretching Exercises improve blood flow and thereby, it improves gradually tolerance level of the subjects. Subjects gradually increased the exercise as tolerated

. So, the fatigue level decreases as the energy levels go high due to physical activity and the patients also realize that they are more energetic to do their daily activities[183] .

QOL- vitality

The mean QOL vitality pre test mean score in the experimental group improved from (37 ± 6.53) in the pretest to (55.76 ± 11.82) in the posttest I and posttest II(71.74 ± 10.02) . In the experimental group there were significant changes at p value at .001 level.

The mean QOL scores in the control group improved from (15.07 ± 11.18) in the pretest to (3 2.22± 10.70) in the posttest I and posttest 11 (41.46 ± 11.48) . In the control group, there were significant changes in the post test p value at (.001 level).

Comparison of posttest QOL Vitality Scores between experimental vs control group

Vitality scores in experimental group in post test 1 (55.76) and post test 2 (71.44) were higher than the mean post test scores of control group post test 1 (32.22) and post test 2 (41.46). The obtained 't' values of post test 1 (10.430) and post test 2 (14.040) were statistically significant at 0.0 01 level. Repeated measure anova proved that intervention is much effective in improving the vitality function of the CABG patients.

QOL-Emotional wellbeing scores

The mean QOL emotional well-being in the experimental group improved from (37.10+21.48)in the pretest to posttest I (56.68± 12.57)and posttest II

(72.96± 9.92). In the experimental group, significant changes were noted in the posttest p value at . 001 level.

The mean QOL emotional wellbeing score in the control group improved from (18.72 ± 16.50) in the pretest to posttestI (36.32± 17.99)and posttest II(43± 17.29). In the control group, there were significant changes in the post test p value at .001 level.

Comparison of posttest QOL-Emotional wellbeing scores between experimental vs control group

Emotional wellbeing scores in the experimental group in post test 1 (56.68) and post test 2 (72.96) were higher than the mean post test scores of control group post test 1 (36.32) and post test 2 (43). The obtained 't' values post test 1 (6.52) and post test 2 (10.62) were statistically significant at 0.0 01 level.

People with several mental disorders are(25-40%) more prone to die from heart disease. Journal of AHA, revealed that depression and anxiety significantly increase the chances of mortality in subjects with cardiac disorder.[184]

Review of literature of the research work published on with follow up advice for the subjects with CABG surgery. The search has yielded 20 studies. Among them 8 studies included final review. The result has concluded that cardiovascular follow up advice has improved subject well being after discharge. The review revealed that videos in association with personalized in person education helped the subjects to realize their priorities and to reach increased results like lower anxiety and depression, reduced admission rates and little post surgery complications.[185]

QOL-social functioning scores

The mean QOL social functioning scores in the experimental group improved from (41.02± 23.47) in the pretest to posttest I (60.63± 16.40) and posttestII(75.67 ± 13.94). In the experimental group , there is significant changes were noted in the posttest p value at. 01 level in posttest II p value at .001 level.

The mean QOL social functioning scores in the control group improved from (28.60± 20.07) in the pretest to posttest I (51.2± 19.18) and Posttest II(59.35± 13.35).In the control group, there were significant changes in posttest I p value at .001 level and posttest II at .01 level.

Comparison of posttest QOL-Social functioning scores between experimental vs control group

Social functioning scores in experimental group in post test 1 (60.6) and post test 2 (75.67) were higher than the mean post test score of control group post test 1 (51.2) and post test 2 (59.35). The obtained 't' values of post test 1 (2.640) and post test 2 (5.970) were statistically significant at 0.0 01 level. Repeated measure anova proved that the intervention is much effective in improving social functioning of the CABG patients.

One of the study is assessed the impact of the whole cardiac rehab program on quality of life and physical activity tolerance .But depression ,anxiety ,worry and social isolation are common trend in subjects participating in the program[186] . The primary objective of these programme must be eliminating some of the signs of illness .The psychosocial benefits such as self esteem and confidence might be enhanced by physical conditioning and education during followup programme. This

programme improved physical and emotional functions which were influenced by social interaction with family, neighbours and coworkers. The current study has proved the understanding of patients to their cardiac status and helped them to increase participation in social activities.

Lifestyle and socioeconomic changes associated with urbanization have led to the higher level risk factors for CVD. According to Third South Asians Diabetes survey , CVD occurs more often and earlier which may be the result of inherent susceptiblity or perhaps unique diets which include higher refined carbohydrates.

Prevention of heart attack involves 3 stages First is primordial prevention, the entire population is targeted for life style modification to prevent the development of risk factors. Secondly , the primary prevention targets individuals who have already developed risk factors and aims to adequately control diabetes, hyper tension and cholesterol .Finally, the Tertiary prevention refers to patients who have already suffered with heart attacks , with emphasis on life style modification along with percutaneous and surgical interventions.[187]

QOL-pain recovery

The mean QOL pain recovery scores of experimental group (38.14± 16.50) improved from the pretest to posttest I (5 6.57± 11.13) and posttest II(70.44 ± 16.84) .In the experimental group, there were significant changes at p value at .001 level.

The mean QOL-Pain recovery scores in the control group improved from(31. 08 ± 9.94) in the pretest to posttestI (53.0 6± 11. 34) and in posttest 11 (61.5 4± 9.3

4) .In the control group, there is significant changes were noted in post test 1 p value at . 0 01 level and in post testII at .0 1 level.

Comparison of posttest QOL-Pain recovery scores in experimental vs control group

Pain recovery scores post test 1 (56.5) and post test 2 (70.44) were higher than the mean post test score of control group post test 1 (53.09) and post test 2 (61.55). The obtained 't' values of post test 1 (3.30) and post test 2 (7.26) is statistically significant at 0.0 1 level. Repeated measure anova proved that ,there is no significant difference exist between experimental and control group patients.

QOL-General health

The mean QOL general health scores of experimental group improved from (51.220± 8.05) in the pretest to posttest I (65.24 ± 8.14) and in posttest II(72.46± 8.97) .In the experimental group , significant changes were noted in posttestI p value at .01 level and posttest II at .001 level.

The mean QOL-general health scores in the control group improved from (47.50± 12.58) in the pretest to(60 +8.11) posttest I and posttestII (62.70± 6.96). In the control group, there is significant changes were noted in posttestI p value at .0 1 level at post test II at .001 level .

Comparison of posttest QOL-General health scores between experimental vs control group

General health scores in experimental group in post test 1 (65.2) and post test 2 (72.46) were higher than the mean post test scores of control group post test 1 (60) and post test 2 (62.7). The obtained 't' value post test 1 (3.200) and post test 2 (6.030)

were statistically significant at 0.001 level. Repeated measure anova proved that, that intervention is effective in improving general health of the CABG patients.

For controlling confounder variables , ANCOVA is used. The significant confounders were education and pretest assessment .After adjusting the effects of confounder ,comparison of adjusted means in two groups w is, again remained significance for QOL-Scores by Repeated measure Anova results. It is proved that intervention is much effective in improving the physical functioning ,Role limitation emotional, vitality emotional wellbeing, social functioning and general health functions.

There is no significant differences obtained from QOL- pain, role limitation physical scores by Repeated measures Anova method after adjusting confounder variables by Ancova method.

Common expected problems are reported within 4-6 weeks such as discomfort or itching from the healing surgical site . Swelling over the area where an artery is taken for grafting. Muscle pain or tightness in the shoulder and upperback and Chest pain which are common around the site of the sternal incision and common psycho social problems which are expected , are Fatigue, mood swings and Depression .Full recovery occurs 6-12 weeks or more after CABG surgery[188] .

The reported problems after discharge are, self reported fatigue, dyspnea, incision site pain, lack of sleep, anorexia, leg edema, incision site dehiscence, increased heart rate and constipation.[189]

The fact that almost all subjects had a minimum of one problem after discharge. Follow up advice during home care must be carried out in order to alleviate the problems of the subjects .

According to world heart day journal which is published in general, body of humans is designed to be physically energetic. Physical activities strengthen the cardiac muscles and increase flow of blood, lower hypertension, increase good cholesterol and aid control weight and diabetes. Properly charted exercise and aerobics are significant ways to prevent heart disorder in all levels without any medical treatment .Intake of Potassium has an major impact in reducing blood pressure. It is a well recorded fact in DASH diet (rich in fruits & vegetables and products with a reduced low fat dairy content of dietary cholesterol as well as saturated fat & total fat). Patients with high blood pressure must basically be asked to eat more fruits & vegetables (4-6 servings/day) and reduce intake of fat & cholesterol. [187]

Life style interventions such as regular physical activity, stopping smoking and good dietary habits can markedly decrease further attack in patients with cardio vascular disease. Encouraging patients to make these modifications, helping them with a specific plan to implement , and follow their progress are essential steps of any effective lifestyle intervention strategies.

Avoid trans fats that are found in roasted product , food and preserved sugars. Avoid processed meats. Use mono saturated fats that are in olive and peanut oil.

Sugar or simple carbohydrates found in regular soft drinks , baked goods and sweets are connected with elevated fat levels, insulin resistance and an aggrevate risk of heart attack.

According to WHOs advice , Cutting down on salt can lower the risk of developing heart disease. Best strategies to reduce salt consumption

1. Reduce level s of salt in beverage products.
2. Ensure healthy food(with low salt)is made available
3. Foster healthy eating environment in public places.
4. Ensure clear food labelling indicate level in salt products

Walking, practising light stretching exercises, relaxation techniques and resuming daily activities help the subject regain their strength gradually while preventing both circulatory and respiratory complications.

Convalescence is the transition period between the discharge after CABG and when the subject returns to work and does other activities. It generally lasts 3 to 6 weeks .Keep doing exercises and resuming normal activities allow the subject to acquire the sense of wellbeing both mentally and physically .In addition , regular physical activity prevents cardio vascular disease[190] .

Combination of intervention strategies like decreasing cholesterol, physical activity stress reduction and yoga reduces development of fatty plaque. Recent investigations have proved that the recent prevalent outer self (body, role, material)conscious approach which helps in activation of psychosocial factors like depression, anxiety, anger, hostility, isolation and chronic life stress. It can qualify remarakably towards cause and initiation of CAD by motivating adoption of un

wanted lifestyle behaviours like smoking, fatty materials and sedentary habits. Besides activating the sympatho-adreno-medullary system, these emotional factors can also promote dysfunction of endo thelium and platelet aggregation[191 -196].

Cardiac rehab programs incorporating core components of nutritional counselling, aggressive essential factor management,(fats , high blood pressure, overweight, high blood sugar and smoking) behavioural intervention, physical activity and exercise training, baseline bodily assessment ,lifestyle modification and education programs have been improving the functional capacity and health related quality of life conditions with cardiovascular disorders.[197] There is a significant change in post test quality of life scores except role limitation physical component scores

The findings of the present study with reference to QOL are supported by the studies and finding of the following experts.

Immediate teaching on disease condition, caring the chest incision ,graft site, demonstration of stretching exercises ,breathing exercises, dietary advices, medication follow up and some of the stress management technique help the patient to feel better. All this discharge advices also need to be given before discharge. Proper follow up is essential through cardiac rehabilitation.

A group of researchers from Australia(National heart foundation) researched on the structured studies of symptoms in relation with a prominent behavioural factors of risk for the development of coronary heart disease or the occurrences of cardiac events. The increased risk contributed to the psychosocial factors such as smoking, dyslipidaemia, and high blood pressure. There is a strong evidence of

an independent casual relation among lack of social support, depression ,social isolation and causes the prognosis of CHD. Incidence of heart attacks among youth can be prevented by awareness programmes on smoking cessation. The importance of regular exercise, and yoga sessions will be useful[198].

The present study findings supported by these following studies

Hose etal[150] evaluated the QOL amongst CABG patients in Malaysia with 69 post CABG patients and were analysed using the medical outcome short form 36 questionnaire. The findings revealed significant differences in the physical functioning domains of quality of life with gender [t=0.286, P=0.05] Duration of physical activity more than 20min had positive effects on both physical [t=2.738, P=<0.05] and mental components [t=7.326, P<.05]. Post CABG patients were found quality of life postoperatively. They were able to adapt whole life style modifications through common physical exercise for their improvement.

Charoenkul[104] studied the effectiveness of cardiac rehabilitation program in Coronary Artery Bypass Surgery (CABG) patients on health related quality of life in Thailand in 2007. Quality of life is evaluated two times using the Thai version of the SF-36 questionnaire. Results showed that After 45 days home based cardiac rehabilitation, the study group had significant increase in their physical performance (3.24 18.70 vs 15.00 18.54, p=0.038), physical role limitation (-1.47 46.33 vs 41.18 37.44, p=0.003), general health (3.82 10.61 vs 23.65 26.61, p=0.005), vitality (10.59 24.42 vs 29.12 17.87, p=0.009), social functioning (7.35 27.97 vs 22.06 17.98, p=0.039), and reported health transition (0.18 1.01 vs -0.94 0.97, p=0.007).

Leila Lavorata etal[126] had done a study to assess the favourable outcomes of Cardiac Rehabilitation Process (CRP) at Canada during 1999-2001 among 64 patients. The findings of this study emphasize better health-related quality of life benefit for the subjects receiving complete cardiac rehabilitation programs .

Life style modification strategies.

Immediate teaching given after CABG surgery on deep breathing and coughing intervention is supported by this study to investigate the immediate effects of deep breathing on postoperative day after CABG surgery. A significant decrease in atlectatic area in aerated lung and a small increase in pao2 after 30 deep breaths.[199] is found to be visible. This is supported by the present view of study.

A double blind peer reviewed study is conducted in 2012 in UK by Edmund[132] for improving the well being with cardiac rehabilitation. There is clear evidence that cardiac rehabilitation improved the health of patients with CVD and 50% of the patients were only accessed in these programmes.

Dietary management as an intervention

A study is done by Naikjay & Roosha[133] in Ahmedabad, India (2010) to "identify the importance of Nutrition in addition to inclusion of exercises in usual life style to avoid along with the care for cardiovascular disease , in turn decreasing the cardiac threat factor and increasing aerobic ability helped the subject's general quality of life.

Zhaoy etal [140] randomized controlled trial reviewed the efficiency of a post discharge programme amongst subjects with coronary heart disease in 2009. The research involved 200 patients, the control group (n=100) received usual treatment

and the experimental group (n=100) The results of this study showed the efficiency of the program denoting that such programmes help patients to maintain active lifestyle and thereby, reduces the risk factors.

The most common deaths worldwide, is due to CHD. But the review supports a large diversity in the implementation of CR and changes in lifestyle. The main aim of this research is to assess the impacts of the number of follow ups by the patient, the duration and also the agenda in cardiac rehabilitation programme about the change of lifestyle in subjects with CHD. An organised review of literature between 1990-2007 is analysed . It yielded 1120 results and 25 articles were shortlisted by criteria setting. Most of the important desirable outcomes on lifestyle factors insisted on high number of follow ups and long duration. The articles considered showcased a diversity whereas, interventions (informative content, educational content, practical content, behavioral and self care-oriented content) were focussed. The researches, which focussed all the above interventions, obtained very desirable outcomes. This organised review of literature concluded that CRP must consist of high number of visits, long duration and also an intervention ranging from information, practical training, activity to improve caring for self and psychosocial alterations for the achievement of the criteria like intake planning, physical activity , aerobics, smoking and stress. An informative and educational content along with the practical nature combined with the factors of lifestyle can lead to a change in lifestyle [200]

Third objective is to correlate between activity tolerance of the patients with CABG surgery who received cardiac rehabilitation programme and their quality of life.

There is a significant correlation between quality of life physical functioning scores and activity tolerance. But, other parametres of quality of life do not have significant correlation with other parameters

Balir etal[101], UK (2010) reviewed and the meta analyses findings showed that patients who participate CR program have significant reductions in mortality morbidity. CR has positive effects in exercise tolerance and quality of life in cardiac patients. There are also improvements in the frequency of angina along with self reported chest pain on movement and shortness of breath.

Fourth objective is to correlate between physiological parameters (heart rate, ECG, ECHO scores) of the patients with CABG surgery who received cardiac rehabilitation programme and their quality of life.

There is no significant correlation between Physiological parameters heart rate scores and their quality of life.

There is a significant correlation between social functioning scores with ECHO (Ejection fraction score) .

However, the findings of the present contradicted with the findings of Soleimani etal [201] who conducted a study to evaluate the impact of cardiac rehab programme on recovery of heart rate of PCI and CABG patients in Teheran heart centre. A total of 240 patients, who completed cardiac rehab programme with PCI n = 62 and CABG n= 178, were included. All the subjects displayed notable

improvement in HR characteristics starting with the baseline to the last of sessions. The array of cardiac risk factors apart from DM is the same among the PCI and CABG patients. After 8 weeks of CR, HRR improved at an average rate about 17 and 21 b/mt among the CABG and PCI, respectively (p=.o19). The study concluded that there is an indication of an increased heart rate recovery over 1mt in subjects regardless of their first revascularization mortality (PCI or CABG) later to finishing CR. PCI subjects reached higher improvement in HRR than CABG subjects.

The above study findings also contradicted with the findings of Dinon, North Eastern University, Boston (2010 with regard to the effectiveness of cardiac rehabilitation program on ejection fraction and quality of life. There is no notable change in left ventricular ejection fraction.

Conclusion

Patient who undergo CABG gave post operative concerns and post operative complications. The current study findings do portray that cardiac rehabilitation was effective in improving the quality of life of CABG patients. Patients have lot of queries related to care of post operative wound, dietary modification, initiation of activities after surgery, modification of life style like smoking, alcoholism and many more. Thus it is of paramount importance to prepare patients adequately to lead a quality life at home and in the society. This can be achieved through cardiac rehabilitation in which nurses play a very important role. Cardiac rehabilitation should be instituted from 5th day onwards with incentive spirometer, abdominal breathing and coughing technique, encouraging ambulation and begin with leg exercises and all the stretching exercises started before 8th day of surgery. Patients

needed guidance for caring wound in the sternum and graft side. It is important to manage stress and life style factors which should be initiated in the first phase of cardiac rehabilitation following coronary bypass because many patients are unprepared and unaware of cardiac rehabilitation. Indeed ,active rehabilitation is essential for the success of longer effects of coronary bypass surgery.

CHAPTER- VI

SUMMARY, CONCLUSION & RECOMMENDATIONS

Introduction

CVD is strongly connected to life style consisting of the usage of tobacco, imbalanced intake, sedentary lifestyle and emotional stress. The World Health Organization has mentioned that about 75% of the deaths due to CVD can be minimised by proper modifications in the way of living. Preventing CVD remains a big factor for the general people at the global level.CABG Surgery is a life saving intervention, but the early recovery period presents number of challenges for patients and nurses. Early and adequate discharge planning based on in depth knowledge of post discharge experience can help to ensure optimal recovery [202]. It is well known that cardiac rehabilitation helps people with cardiac disorder to lead an energetic and better life . It minimizes the chance of an attack again. It is a systematic way to achieve normal life after surgery. It is an integrated approach. It includes physical activity and some intervention strategies. Several studies have shown effectiveness of cardiac rehabilitation programme. Hence, it is necessary to help the CABG patients to lead a healthy and happy life after cardiac rehabilitation program.

This chapter is organised into three sections such as the summary of the study, summary of the study findings and conclusions.

a) Summary of the Study:

This present study has been undertaken to assess the effectiveness of cardiac rehabilitation program on activity tolerance, physiological parameters (HR, ECG) and quality of life among CABG patients in Government Rajaji Hospital , Madurai, Tamilnadu.

6. 2 OBJECTIVES

- To findout the pre test and post test activity tolerance, selected physiological parameters (heart rate, ECG,ECHO) and quality of life of patients with CABG surgery in experimental and control group.
- To findout the effectiveness of cardiac rehabilitation programme in terms of activity tolerance, selected physiological parameters (heart rate, ECG,ECHO) and quality of life of patients with CABG surgery.
- To findout the relationship between activity tolerance of the patients with CABG surgery who received cardiac rehabilitation programme and their quality of life.
- To findout the relationship between physiological parameters (heart rate, ECHO) of the patients with CABG surgery who received cardiac rehabilitation programme & their quality of life.

6.3 Hypotheses

- The mean post test scores of activity tolerance of the experimental group, who received cardiac rehabilitation programme, will be significantly higher than their pre test score.
- The mean post test scores of activity tolerance of patients with CABG in the experimental group ,who received cardiac rehabilitation programme, will be significantly higher than the mean post test score of control group.
- The mean post test scores of selected physiological parameters (heart rate, ECG,ECHO) of the experimental group of patients with CABG, who received cardiac rehabilitation programme, will be significantly higher than their pre test score.

- The mean post test scores of selected physiological parameters (heart rate, ECG,ECHO) of the patients with CABG in the experimental group, who received cardiac rehabilitation programme, will be significantly higher than the mean post test score of control group
- The mean post test scores of quality of life of the experimental group of patients with CABG, who received cardiac rehabilitation programme, will be significantly higher than the pre test score
- The mean post test scores of quality of life patients with CABG in the experimental group, who received cardiac rehabilitation programme, will be significantly higher than the mean post test score of control group.
- There will be significant positive correlation between activity tolerance of the experimental group who received cardiac rehabilitation programme and their quality of life.
- There will be significant correlation between physiological parameters of the experimental group who received rehabilitation programme and their quality of life.

The purpose of the study is to assess the effectiveness of cardiac rehabilitation programme on activity tolerance, physiological parameters (HR,ECG,ECHO) and Quality of life. Conceptual framework used for the study is based on Roy adaptation model. An indepth literature review has been done for the study. A quantitative approach is used. This is a quasi experimental study. The design used in the study is quasi experimental non equivalent pre test & post test control group for testing the relationship among variables. The data collection is conducted for a period of one year on 100 samples of CABG patients with 50 for

experimental group and 50 for control group . Total enumerative sampling technique is used. The target population for this study is patients diagnosed to have heart blocks in the coronary artery who had underwent CABG surgery in Government Rajaji Hospital. Accessible populations for this study is the patient who had undergone C ABG surgery in Government Rajaji Hospital during the period of data collection. This study has been conducted at Government Rajaji Hospital, Madurai, Which is situated in Madurai town. This hospital has a bed strength of 2500 with various specialities and superspecialities .The study has been conducted in cardiothoracic postoperative unit which is 20 bedded. Every week, 2 CABG Surgeries are performed .They stay upto 12 days after surgery. As per the pilot study conducted , the minimum required sample size is 48 in each group. The data collection period is May 2013-April 2014. The tool used for data collection is Duke activity status index for activity tolerance and Physiological parameters (HR,ECG,ECHO) are assessed .Quality of life is assessed by SF36 Questionnaire based on objectives and hypothesis of the study. The subjects included are selected based on inclusion and exclusion criteria. Subjects included were male and female undergone CABG surgery who were on 5th postoperative day aged between 35-75 . Patients, who had CABG surgery with either single vessel/ double vessel / triple vessel disease and had undergone CABG surgery, were taken. The patients who had neurological complications and unconscious ,Renal complications and Cardiac problems were excluded from the study. Intervention strategies include planned teaching programme and demonstration. The interventions were administered to the experimental group for 3 days. Post test assessment is done at 30 and 60 days. The experimental group received cardiac rehabilitation and control group did not receive intervention. The tools used for data collection had 2 parts.

1. Demographic data

2 . Activity tolerance is assessed by duke activity status index and physiological parameters Heart rate ,ECG, and ECHO were assessed .Quality of life is assessed by SF 36 questionnaire.

A pilot study is conducted to assess the feasibility of the study. Main study is conducted with 100 samples (50 in experimental group,50 for control group) for a period of one year. The collected data were analysed using descriptive and inferential statistics.

6. 4 Major findings of the study

Demographic profile of CABG Patients.

In experimental group, majority of them were between the age of 50-59 (42%) and in control group, 40-49(44%) .In experimental group , 94% of them were male and in control group , 92%. and only about 6% and 8% of them female in experimental and control group , respectively. In experimental group, 50% of them were educated upto primary level and in control group , 76% had primary education. In case of religion, 88% were Hindus and in control group, 92% were Hindus . Only about 4% and 6% were Christians, 8% and 2% were Muslims in both experimental and control groups respectively.

Clinical profile of the CABG Patients.

In experimental group, 22% had diabetes mellitus as a co morbid condition . The subjects with both Diabetes mellitus and Hypertension were 28% and 32% in control group, respectively. In experimental group, 38% were in the habit of smoking and alcoholism and it is in 42% in the control group. Food habits of

intervention and control group showed occasional non veg respectively 92% and 88%. Same number of subjects almost 86% in experimental group and84% in control group had triple vessel disease and undergone coronary artery bypass graft. In experimental group 36% has systolic BP above 130mmHg. In case of control group 32% had systolic BP above 130mmHg. With regard to heart rate 16% had tachycardia in experimental group and control group 2% had tachycardia.

Summary of the study findings

Activity tolerance

The mean post test scores of activity tolerance of the samples in the experimental group (18.52,22.3) ,who received cardiac rehabilitation programme, is higher than their pre test score(14.84) In both the group ,with in the group there are significant changes. Mean post test of activity tolerance scores of experimental group (18.520 &22.300) is higher than the mean post test score of control group (14.800&15.700) which is highly significant at . 001 level in between the group comparison . For controlling confounder variables ANCOVA (Analysis of covariance) is used .The significant confounders ,comparison of adjusted mean groups ,again remained significant for activity tolerance($p<.001$,$p<.001$).Repeated measure Anova results proves that intervention is much effective in improving the activity tolerance of the CABG patients.

Physiological parameters

Heart rate

Mean post test scores of physiological parameters of Heart rate scores of experimental group post test I(t=4.31 p=.001) and post test scoresII (t=2.7 p=.008 significant at .01 level) and control group in posttest I (t=3.03 p=.004 significant at

.01)level and posttest II (t=.73 p=.467) were not significant at 0.0 1 level .But in both the group comparison, there are no significant changes in heart rate scores. . For controlling confounder variables ,ANCOVA (Analysis of covariance) is used .The significant confounders were education and pretest assessment.After adjusting for the effcts of confounders ,comparison of adjusted mean groups ,again not remained significant for heart rate scores. The nonsignificant p value in repeated measure Anova results proves that the intervention has no influence on the heartrate of the CABG patients.

ECG

The mean ECG-ST Depression scores of the experimental group with in pre and posttest comparison (t=18.42 p=.001) and in control group(t=9.20 p=.001) show significant changes. Comparison between groups mean post test scores of physiological parameters of ECG ST Depression score of experimental group (1.35) is better than the post test scores of control group (2. 0) which is highly significant at . 001 level. l. It proves that intervention is effective in reducing minimal ischaemic status of the CABG patients.

ECHO

The mean Echo-EF score of the experimental group within pre and posttest comparison is (t=3.185 p= .001).The significant p value infers that there is increase in Echo -EF level. But in control group, (t=.583 p=.682) it infers that there is no significant change in mean level . The comparison of posttest of experimental and control group Echo-EF score (t=.979 p=.330) has no significant changes. The non significant Pvalue infers that intervention has no influence on Echo-EF scores.

QOL-SCORES

QOL- Physical functioning scores

The mean QOL physical functioning scores of experimental group improved from (46.60+ 24 .27) in the pretest to Post test 1(63+17.14) and posttestII (79+15.41). In the experimental group , there were significant changes in the post test(p value .001) level. The mean QOL-Physical functioning scores of control group improved from (28.500+23.21) in the pretest to (37.7+16. 91) in the posttest I and in the posttest II(47.3+15.55). In control group there are significant changes in the post test (p value at . 01) level . Mean physical functioning scores in the experimental group, in post test 1 (63) and post test 2 (79) were higher than the mean post test score of control group, post test 1 (37.7) and post test 2 (47.3). The obtained 't' values of post test 1 (7.43) and post test 2 (10.230) were statistically significant at 0.0 01 level . Repeated measure anova results proved that intervention is much effective in improving the physical functioning of the CABG patients.

QOL-Role limitation physical scores

QOL role limitation physical scores of experimental group improved from (43.00+40.06) in the pretest to (48 .6+35.97) in the Posttest I and posttest II (56.6+30.48). In the experimental group, there is no significant change in the posttest p value at .0 1 level. The mean QOL -Role limitation score of control group improved from (27.12+ 23.98) in the pretest to (34. 22+24.14) in the posttest 1 and posttest II (48.20+24.63) In control group , there is no significant changes at (.0 1level) .In both the group Role limitation physical component did not show significant changes. Role limitation physical scores in experimental group in post test 1 (48) and post test 2 (56.66) were higher than the mean post test score of control

group post test 1 (40.7) and post test 2 (48.2). The obtained 't' values of the post test 1 (1.200) and post test 2 (1.500) were not statistically significant at 0.0 1 level. Reapeated measure anova proved that there is no significant differences exist between two groups in role limitation physical scores.

QOL-Role limitation emotional scores

The mean QOL role limitation emotional in the experimental group improved from (40.69+43.66) in the Post test 1 (49.44 +38.62) and posttest II (6 1+ 31.43). In the Experimental group, significant change is noted in the posttest I p value at . 01 level.But there were significant changes in the posttestII p value at .001 level. The mean QOL scores in the control group improved from (27. 12+ 23.98) in the pretest to (34. 22+24.14) in the posttest I and posttest II (39.12+22.74).In the control group, there is no significant change in posttestI and II and p value is obtained at .01 level . Role limitation emotional scores in experimental group in post test 1 (4 0) and post test 2 (62.2) were higher than the mean post test score of control group post test 1 (34.2) and post test 2 (39.12). The obtained 't' values of post test 1 (2.350) and post test 2 (4.200) were statistically significant at 0.0 01 level. Repeated measure anova results proved that intervention is much effective in improving Role limitation emotional functioning of the CABG patients.

QOL-Vitality scores

The mean QOL vitality pre test mean score in the experimental group improved from (37 +16.53) in the pretest to (55.76 +11.82) in the posttest I and posttest II(71.74 +10.02) . In experimental group, there were significant changes at p value at .001 level. The mean QOL scores in the control group, improved from

(15.07 +11.18 **)** in the pretest to (3 2.22+10.70) in the posttest I and posttest 11 (41.46+11.48) . In the control group, there were significant changes in the post test p value at(.001 level).

Vitality scores in experimental group in post test 1 (55.76) and post test 2 (71.44) were higher than the mean post test scores of control group post test 1 (32.22) and post test 2 (41.46). The obtained 't' values of post test 1 (10.430) and post test 2 (14.040) were statistically significant at 0.0 01 level. Repeated measure anova results proved that intervention is much effective in improving vitality of the CABG patients.

QOL-Emotional wellbeing scores

The mean QOL emotional well-being in the experimental group improved from (37.10+21.48)in the pretest to posttest I (56.68+12.57)and posttestII(72.96+9.92). In the experimental group, significant changes were noted in the posttest p value at . 001 level. The mean QOL emotional wellbeing score in the control group improved from (18.72 +16.50) in the pretest to posttestI (36.32+17.99)and posttest II(43+17.29). In the control group, there are significant changes in the post test p value at .001 level. Emotional wellbeing scores in experimental group in post test 1 (56.68) and post test 2 (72.96) were higher than the mean post test scores of control group post test 1 (36.32) and post test 2 (43). The obtained 't' values of post test 1 (20.300) and post test 2 (29.900) were significant at .001 level. Repeated measure anova results proved that intervention is much effective in improving emotional wellbeing of the CABG patients.

QOL-Social functioning scores

The mean QOL social functioning scores in the experimental group improved from (41.02+23.47) in the pretest to posttest I (60.63+16.40) and posttestII(75.67 +13.94). In the experimental group , Significant changes were noted in the posttest p value at. 01 level in posttest II p value at .001 level.The mean QOL social functioning scores in the control group improved from (28.60+20.07) in the pretest to posttest I (51.2+19.18) and Posttest II(59.35+13.35).In the control group, there were significant changes in posttest I p value at .001 level and posttest II at .01 level.

Social functioning scores in experimental group in post test 1 (60.6) and post test 2 (75.67) were higher than the mean post test score of control group post test 1 (51.2) and post test 2 (59.35). The obtained 't' values post test 1 (2.640) and post test 2 (5.970) were statistically significant at 0.0 01 level. Repeated measure anova results proved that intervention is much effective in improving social functioning of the CABG patients.

QOL-pain recovery

The mean QOL pain recovery scores of experimental group (38.410+16.50) improved from the pretest to posttest I (5 6.57+11.13) and posttest II(70.44 +16.84) .In the experimental group, there were significant changes at p value at .001 level. The mean QOL-Pain recovery scores in the control group improved from(31. 08 + 9.94) in the pretest to posttestI (53.0 6+11. 34) and in posttest 11 (61.5 4+9. 54) .In the control group , there is significant changes were noted in post test 1 p value at . 0 01 level and in post testII at .0 1 level. Painrecovery scores post test 1 (56.5) and post test 2 (70.44) were higher than the mean post test score of control group post test 1 (53.09) and post test 2 (61.55). The obtained 't' values of post test 1(3.30)

and post test 2 (11.26) were statistically significant at 0.0 1 level. Reapeated measure anova proved that there is no significant differences exist between two groups in pain recovery.

QOL-General health

The mean QOL general health scores of experimental group improved from (51.220+8.05) in the pretest to posttest I (65.24 +8.14) and in posttest II(72.46+8.97) .In the experimental group, significant changes were noted in posttestI p value at .01 level and posttest II at .001 level. The mean QOL-general health scores in the control group improved from (47.50+12.58) in the pretest to(60 +8.11) posttest I and posttestII (62.70+6.96). In the control group, significant changes were noted in posttestI p value at .0 1 level at post test II at .001 level.

General health scores in experimental group in post test 1 (65.2) and post test 2 (72.46) were higher than the mean post test scores of control group post test 1 (60) and post test 2 (62.7). The obtained 't' values of post test 1 (3.200) and post test 2 (6.030) were statistically significant at 0.001 level. Repeated measure anova results proved that intervention is much effective in improving general health of the CABG patients.

For controlling confounder variables ANCOVA is used. The significant confounders were education and pretest assessment .After adjusting the effects of confounder ,comparison of adjusted means in two groups were,again remained significance for QOL-Scores. Repeated measure Anova results prove that intervention is much effective in improving the physical functioning ,Role limitation

emotional, vitality emotional wellbeing,social functioning and general health functions.

There is no significant difference obtained from QOL- pain, role limitation physical scores by Repeated measures Anova method after adjusting confounder variables by Ancova method.

There is a significant positive correlation among Quality of life, physical functioning score and activity tolerance scores. There is no significant positive correlation between QOL scores and heartrate scores in physiological parameters. There is a significant positive correlation between QOL- social functioning score and ECHO-EF scores in physiological parameters.

The results showed that the CABG patients received cardiac rehabilitation programme had increased activity tolerance scores in post test I&II 18.52&22.3 which are statistically significant at .001 level.The present study findings concluded that cardiac rehabilitation has positive effects on activity tolerance ,physiological parameters (ECG) and Quality of life.

6. 5 Impact of study:

Cardiac rehabilitation programmes are offered as organised sessions with monitored physical activity. This is adapted to the capacities of those who attended. It has provided way to know further regarding the subject's state, the means to pacify and make a better come back. Additional knowledges provided by nurses are about good dietary pattern and reducing cholesterol, the significance of physical activity, the difference between heart attack and angina & about medication. There is good evidence that people who attended cardiac rehabilitation programmes are better and

keep doing well. It is an opportunity for them to learn more about their own condition and recovery. It is a good introduction to enjoyable exercise and most people reported that they feel more confidence. It helps the person to have positive life style changes and empowering the process of getting information and the skills, that can lead to change human behaviours are needed for the betterment of health.

It is largely accepted that the period during hospitalization is considered more appropriate period for starting rehabilitation to identify patients who are in need of intense and appropriate treatment accordingly further vascular disease prevention. The professional nurse's role is important in cardiac rehabilitation.

The findings of the present study indicate that cardiac rehabilitation programme among CABG patients can improve the activity tolerance, physical parameters & QOL. The role of the medical surgical nurse is important, because they play a valuable role in improving activity tolerance, physiological parameters and quality of life. According to the results of present study, cardiac rehabilitation programmes offered in different courses can improve activity tolerance of the physiological parameters and improve quality of life.

6.6 Conclusion

Cardiac rehabilitation nurses work with adults with heart disorders or those who are at risk. Nurses in this speciality promote heart health by making patients change their lifestyles (like lessening stress; good dietary pattern; physical activity; quitting smoking) to reduce the risk of heart diseases and its complications and to reduce the lasting effects of prior cardiac events.

1. Knowledge has strong influence in adoption of healthy behaviour. It helps to determine the health condition and treatment. These changes include heart healthy diet, increasing physical activity and managing stress.
2. Intervention strategies enhance the level of knowledge on further management.
3. Further, cardiac rehabilitation improves the adherence behaviour among patients with CABG by understanding the importance of medication.
4. It is an effective intervention for improving quality of life and activity tolerance among patients with CABG.
5. It helps to address risk factors of High blood pressure, High blood cholesterol, Diabetes, Smoking,Lack of physical activity, Depression and other Emotional health problems.
6. It enhances Psychosocial wellbeing and stress reduction.
7. Current study findings reveal that education about cardiac rehabilitation helps to improve self confidence and self esteem.

Based on the study, it is concluded that the combination of interventions like teaching, demonstration of exercises ,providing pamphlet on cardiac rehabilitation and telephone reinforcement are capable of increasing the adherence behaviour to cardiac rehabilitation and thereby improving the activity tolerance and quality of life .Further occurrence of disease and hospital readmission will be prevented for those who received cardiac rehabilitation programme .It improves compliance and adherence to therapeutic treatment .

6. Nursing implications

The findings of the study have practical application in the nursing. The findings in the present study will help in the nursing in following way. It has been described in 4 areas. The findings of the present study support that cardiac rehabilitation is effective to improve activity tolerance, physiological parameters and quality of life.

Nursing Practice:

The findings of the present study will help the nursing practice in the following way.

- The nurses working in hospitals, clinical and community settings should administer cardiac rehabilitation programme for patients with CVD. Continuous practice of rehabilitation programme may be advised to the patients for taking up psychological, physical and social functioning.
- Clinical nurses should encourage the patients to learn about adherence strategies and to follow systematically, continuously and daily utilizing this opportunity. Nurses could involve family members to enhance their knowledge on treatment adherence.
- Clinical education should be provided for all the nurses to assess the need of CABG patients and to plan cardiac rehabilitation after surgery.
- Cardiac rehabilitation should be done as a routine care for all cardiac patient.
- Conducting cardiac rehabilitation classes to family members also to motivate their adherence in homecare setup.

Nursing Education:

The findings of the present study will help the nurse educator in the following way.

- Curricula can be issued to nursing students and primary health care providers for incorporating effective components of cardiac rehabilitation programme.
- In service education can be organized on cardiac rehabilitation.
- Continuing nursing education program on cardiac rehabilitation can be organized for the nurses in the clinical setting.
- Indian Nursing Council had established post certificate diploma course on cardio thoracic nursing where cardiac rehabilitation for nurses is highly emphasized. The pamphlet prepared for the present study can form important guidelines for nursing students to plan for health education to cardiac patients.

Nursing Administration:

The findings of the present study will help the Nurse administrator in the following way.

- Nurse administrator can formulate policies and protocols on cardiac rehabilitation program with research evidence.
- They can arrange tele -nursing conferences for nursing service personnel for student education.
- A pamphlet highlighting different aspects of cardiac rehabilitation programme can be provided to all patients with CABG surgery.
- Nurse administrator can collaborate with health care team members for the smooth running of the cardiac rehabilitation programme.

- Nurse administrator can organize short term course like seminars, conferences and workshops to update the nurses.
- Nurse administrator can organize learning materials for long time courses to specialize cardiac rehabilitation programme.
- Nurse administrator can arrange health education campaign in community set up to educate cardiac rehabilitation programme.

Nursing Research:

The findings of the present study will help the Nurse researcher in the following way.

- Nurse researchers can carryout systematic review to develop evidence base to formulate cardiac rehabilitation strategies.
- Nurse researcher should utilize various opportunities to communicate research findings in oral form or in written form. Dissemination of research findings is pre requisite for the implementation of research findings in nursing practice. So that, it can be introduced to various hospitals.
- Similar study can be conducted in different settings.

6.6Limitations

The limitations of the study as follows

1. The participants represented 100 CABG patients which may not be allowed for generalizing the findings to other patients in ward settings.
2. The follow up of the rehabilitation had to be carried out over phone by giving frequent remainders

3. The same settings were used for both groups. Hence there is a possibility for contamination. This is prevented by taking control group sample first and intervention group after wards.
4. The researcher had trouble in teaching illiterate people. This problem is solved by frequent interactions with the patients.
5. .Long term follow up is not possible because of limited availability of time.

6.7 Recommendations:

- Qualitative and lived in experience of patients with CABG surgery can be researched.
- A comparative study can be done between home based and in patient cardiac rehabilitation.
- Long term follow up study after cardiac rehabilitation in patients CABG can be done for sustaining the benefits. A similar study can be conducted as a video assisted teaching program with adequate follow up.
- A multicenter study may be carried out with same interventions.
- The continuation of bio physiological parameters and other psychosocial interventions can be investigated.
- Interventional study to improve the compliance behaviour can be done among CABG patients.
- Phenomenology study can be done to find out the barriers for adherence to cardiac rehabilitation and to find out the factors to overcome those barriers for adherence.

- Quantitative approach can be mixed with qualitative approach while studying the effect of intervention strategies in improving activity tolerance and quality of life among CABG patients.

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APPENDIX I

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

SACRED HEART NURSING COLLEGE

ULTRA TRUST

4/235, COLLEGE ROAD
THASILDAR NAGAR
MADURAI 625020
PHONE: 2534593

Ref. UT: SHNC: Ph.D (N) : 2010 Date: 26.07.2010

ETHICAL COMMITTEE

The following members of the ethics committee were present at the meeting held on 26.07.2010 at 2.20 pm in Sacred Heart Nursing College.

CHAIR PERSON

1. **Dr.SABHESAN, M.B.B.S. DPM, MNAMS, Ph.D.**
   Head, Department of Psychiatry
   CSI Mission Hospital, Madurai.

DEPUTY CHAIRMAN

2. **Dr.NALINI JEYAVANTH SANTHA, M.Sc., (N) Ph.D.**
   Principal, Sacred Heart Nursing College, Madurai – 625 020.

MEMBER SECRETARY

3. **Prof. S.CHANDRAKALA, M.Sc., (N) Ph.D**
   Vice Principal, Sacred Heart Nursing College, Madurai – 625 020.

MEMBERS

4. **Prof. K.R.ARUMUGAM M.Pharm**
   Chairman,
   Ultra Trust.

5. **Dr.K.N. KRISHNAN MBBS M.S** (General Surgery)
   Best Dental Science College, Ultra Nagar,
   Madurai.

6. **Dr.SUBRAMANIAN, M.D. (Pathology)**
   Head, Department of Pathology,
   Best Dental Science College &
   Former President of Rotary Club, Madurai.

7. **Prof. JULIET SYLVIA, M.Sc., (N) Ph.D.**
   Head, Department of Community Health Nursing,
   Sacred Heart Nursing, Madurai – 625 020.

8. **Prof. DEVAKIRUBAI, M.Sc., (N) Ph.D.**
   Professor, Department of Medical Surgical Nursing,
   Sacred Heart Nursing, Madurai – 625 020.

...2...

SACRED HEART NURSING COLLEGE

ULTRA TRUST

4/235, COLLEGE ROAD
THASILDAR NAGAR
MADURAI 625020
PHONE: 2534593

Ref. UT: SHNC: Ph.D (N) : 2010

Date: 26.07.2010

9. Dr. VIJAYA, M.Pharm., Ph.D
Dean, Clinical Pharmacologist
Ultra College of Pharmacy, Madurai

10. Mr. CHINNAKARUPPAN M.A., B.L., DCFSC
Advocate and Notary Public,
14, Asari Street, Thallakulam, Madurai – 2.

11. Mr. SURESH KUMAR, M.A., M.Phil., (Psy) Ph.D
Asst. Prof. Cum Clinical Psychologist,
Dept. of Psychiatry,
Govt. Rajaji Hospital, Madurai – 625 020.

12. Dr. VICTOR P. LAWRENCE, D. Div.
Theologist, Madurai.

RESOLUTION – 2/2010

It is resolved to accept Mrs. ANDAL P. to conduct a study in the Topic "A study to evaluate the effectiveness of cardiac rehabilitation programme on activity tolerance, selected physiological parameters and quality of life among hospitalized patients with myocardial infarction from selected hospitals of Madurai District".

The institutional Ethics Committee expects to be informed about the progress of the study, any changes in the protocol, patient information and asks to be provided a copy of the final report.

Yours Sincerely

Chair Person
Ethics Committee

Dr.SABHESAN, M.B.B.S. DPM, MNAMS, Ph.D.

Member Secretary
Ethics Committee

Prof. S.CHANDRAKALA M.Sc., (N) Ph.D

APPENDIX II

LETTER SEEKING FOR ETHICAL CLEARENCE

From

Prof Dr.R.A.Janarthanan M.D DM,
Professor & HOD, Dept of Cardiology,
Govt Rajaji Medical Hospital,
Madurai Medical College,
Madurai-20.

To

The Member Secretary,
Institutional Review Board,
Government Rajaji Hospital,
Madurai Medical College,
Madurai-20.

Sub: **Requesting permission to conduct research work(permission to do research work)**

Respected Sir,

I herewith grant permission for Mrs.Andal,Asso.Professor,Sacred Heart Nursing college who is currently pursuing her ph.D programme under Tamilnadu Dr.M.G.R.Medical university to undertake the research project on "Effectiveness of cardiac Rehabilitation on activity tolerance, Physiological Parameters (Heart Rate,BP) and quality of life" under the clinical guidance of me in the cardiology department of GRH Madurai. She will conduct teaching, counselling and exercise sessions for the patients after getting written informed consent under the guidance of medical personnel. I have gone through her research proposal and find that it will be helpful to cardiology patients. Wishing her all the best for successful completion of research work.

Thanking you

6/3/12

From

Mrs.Andal M.Sc(N)

Asso. Professor

Sacred Heart Nursing College

Madurai

To

The Chairman

IEC(Institution Ethical Committee)

Govt Rajaji Hospital ,

Madurai medical college,

Madurai-625020.

Through proper channel

Respected Sir/Madam

Sub: Ethical clearance approval of the project from ethical committee

Requested regarding **EFFECTIVENESS OF CARDIAC REHABILITATION PROGRAMME ON ACTIVITY TOLERANCE SELECTED PHYSIOLOGICAL PARAMETERS (HR,BP) AND QUALITY OF LIFE.**

As this project involved in human being. I request for an ethical committee

I am enclosing the details of my project work.

I submit the following undertaking.

1. I will get detailed informed consent from the patients/participants & maintain confidentiality
2. I will carry out the work without detrimental to regular activities as well as without extra expenditure to be institution or government

3. I will inform the IEG in case of any change of study procedure site and patients/participants and maintain confidentiality
4. I will not derivate form the area of the work for which I applied for ethical clearance.
5. I will inform IEG immediately in case of any adverse events of serious adverse reactions.
6. I will abide to the rules & regulation of the institution.
7. I will complete the work in the time period I applied for and if any extension time require, I shall apply for permission again and do the work.
8. I will submit it the summary of the work to the ethical committee on completion of the work.
9. I will not claim any funds from the institution while doing the work or on completion.
10. I understand that the members of IEG have be right to monitor the work with prior intimation

Thank you very much

Date

yours faithfully

Recommendation and signature of the guide

Details of the project to be submitted by the individual desirous for clearance from ethical committee

Title	**Effectiveness Of Cardiac Rehabilitation Programme On Activity Tolerance Selected Physiological Parameters (HR,BP) And Quality Of Life.**
Aims & Objective	To assess the pretest and posttest activity tolerance, selected physiological parameters (heart rate, blood pressure) and quality of life of patients with myocardial infarction in experimental group who had cardiac rehabilitation programme. To assess the pretest and posttest activity tolerance, selected physiological parameters (heart rate, Blood pressure) and quality of life of patients with myocardial infarction in control group. To evaluate the effectiveness of rehabilitation programme in terms of activity tolerance, selected physiological parameters (heart rate, blood pressure) and quality of life of patients with myocardial infarction.
Design	Time series design
Period	2 years

Collaborating Dept	cardiology
Selection of study subjects	Patients who had myocardial infarction
Ethical clearance	Applied waiting for approval
Consent	Individual written & informed consent
Analysis	Statistical
Conflict of interest	Nil
Financial support	Nil
Participants	Patients who had myocardial infarction
Principal worker	Mrs.Andal

APPENDIX III

ETHICAL CLEARENCE FROM SETTING

Ref. No. 3104/E4/3/2012 Govt.Rajaji Hospital,Madurai.20.
Dated: .03.2012

Institutional Review Board / Independent Ethics Committee.
Dr. A. Edwin Joe, M.D (FM), BL.,
Dean, Madurai Medical College & 2521021 (Secy)
Govt Rajaji Hospital, Madurai 625020.
Convenor
grhethicssecy @gmail.com.

Sub: Establishment-Govt. Rajaji Hospital, aMadurai-20-
Ethics committee-Meeting Agenda-communicated-regarding.

The Ethics Committee meeting of the Govt. Rajaji Hospital, Madurai was held at 11.00 Am to 1.00Pm on 29.03.2012 at the Dean Chamber, Govt. Rajaji Hospital, Madurai. The following members of the committee have been attended the meeting.

---

1. Dr.N.Vijayasankaran,M.ch(Uro.) 094-430-58793 0452-2584397	Sr.Consultant Urologist Madurai Kidney Centre, Sivagangai Road,Madurai	Chairman
2. Dr.P.K. Muthu Kumarasamy, M.D., 9843050911	Professor & H.O.D of Medical, Oncology(Retired)	Member Secretary
3. Dr.T.Meena,MD 094-437-74875	Professor of Physiology, Madurai Medical College	Member
4. Dr. S. Thamilarasi, M.D (Pharmacol)	Professor of pharmacology	
5. Dr.Moses K.Daniel MD(Gen.Medicine) 098-421-56066	Professor of Medicine Madurai Medical College	Member
6. Dr.M.Gobinath,MS(Gen.Surgery)	Professor of Surgery Madurai Medical College	Member
7. Dr.S. Dilshadh, MD(O&G) 9894053516	Professor of OP&Gyn Madurai Medical College	Member
8. Dr.S.Vadivel Murugan., M.D, 097-871-50040	Professor of Medicine Madurai Medical College	Member
9. Shri.M.Sridher,B.sc.B.L. 099-949-07400	Advocate, 2, Deputy collectors colony 4th street KK Nagar, Madurai-20.	Member
10. Shri.O.B.D.Bharat,B.sc., 094-437-14162	Businessman Plot No.588, K.K.Nagar,Madurai.20.	Member
11.Shri. S.sivakumar,M.A(Social) Mphil 093-444-84990	Sociologist, Plot No.51 F.F, K.K Nagar, Madurai.	Member

Following Projects were approved by the committee

Sl. No	Name of P.G.	Course	Name of the Project	Remarks
1.	Andal. P	(Ph.D)	Sacred Hearts Nursing College: Effectiveness of cardiac rehabilitation program.	Approved

Please note that the investigator should adhere the following: She/He should get a detailed informed consent from the patients/participants and maintain Confidentially.

1. She/He should carry out the work without detrimental to regular activities as well as without extra expenditure to the institution to Government.
2. She/He should inform the institution Ethical Committee in case of any change of study procedure site and investigation or guide.
3. She/He should not deviate for the area of the work for which applied for Ethical clearance. She/He should inform the IEC immediately, in case of any adverse events pr Serious adverse reactions.
4. She/he should abide to the rules and regulations of the institution.
5. She/He should complete the work within the specific period and apply for if any Extension of time is required She should apply for permission again and do the work.
6. She/He should submit the summary of the work to the Ethical Committee on Completion of the work.
7. She/He should not claim any funds from the institution while doing the word or on completion.
8. She/He should understand that the members of IEC have the right to monitor the work with prior intimation.

DEAN

To
All the above members and Head of the Departments concerned.
All the Applicants.

APPENDIX IV

A-ETHICAL CONSENT FORM

1. I am willing to join cardiac rehab programme with doctors suggestion
2. Here dietary management , counselling and exercise therapy also will be taught
3. Exercise gradually increases so that blood flow increases . If it's done excess blood flow and heart rate increases. So that it will be done carefully
4. If adverse effect happen I was informed to see the doctor. According to the doctor's advice prescription was changed for exercise
5. I am very much satisfied to participate in this session
6. I am given freedom to leave the session
7. I am satisfied to attend all this session because my questions were answered
8. I was given assurance not to share any of my matters to others
9. All this data's only used for research study
10. According to my suggestion the results of the datas will be shared with others

Date **Participant Signature**

APPENDIX IV B

ஒப்புதல் படிவும்

1. நான் எனது விருப்பத்துடன் இந்த இதய மறுவாழ்வு வழிகாட்டுதலுக்கும் இருதய வியாதிக்கான காரணங்களை மாற்றி அமைக்கும் இந்த இயக்கத்தில் சேருகிறேன். இந்த இயக்கத்தில் பங்கு பெறுவதற்கு மருத்துவரின் அனுமதி மூலம் பரிந்துரைக்கப்பட்டது.
2. இதில் உடற்பயிற்சி, உணவு பற்றிய ஆலோசனை மற்றும் இருதய வியதிக்கான காரணங்களை மாற்றி அமைக்கும் காரணிகள் பற்றிய பாடங்கள் கற்றுத்தரப்படும். ஒவ்வொருக்கும் அவருடைய நோயின் தரமறிந்து உடற்பயிற்சி கற்றுத்தரப்படும்
3. உடற்பயிற்சியானது கொஞ்சம் கொஞ்சமாக அதிகரிக்கப்பட்டு அதன் மூலமாக இதயத்திற்கான ரத்தம் ஒட்டம் அதிகரிக்கப்படும். அதிகமான உடற்பயிற்சியால் ஏற்படும் அதிகமான இதயத்துடிப்பு, இரத்தம் ஒட்டம் மற்றும் இதய ஒட்டம் ஆகிய ஏற்படாமல் தடுக்க கவனமான முறையில் உடற்பயிற்சியானது.
4. இந்த உடற்பயிற்சியை ஆரம்பிப்பதற்கு முன்பே நான் அசாதாரண விளைவுகள் ஏற்பட்டால் நான் அதை உடனே மருத்துவரிடம் எடுத்துக் கூறுமாறு அறிவுறுத்தப்பட்டேன். இது என் உடலின் தன்மைக்கு ஏற்றவாறு உடற்பயிற்சியை மாற்றி அமைப்பதற்கு உதவும்.
5. நான் எல்லாவற்றையும் புரிந்து கொண்டு என் முழுமனதுடன் இந்த இயக்கத்தில் கலந்து கொள்ள சம்மதிக்கிறேன்.

6. எந்த விதமான சூழ்நிலையிலும் இதிலிருந்து விலகிக்கொள்ள உரிமை உண்டு என்று புரிந்து கொண்டேன்.
7. நான் என்னுடைய முழு விருப்பத்தின்படி எல்லாவற்றையும் படித்துப் புரிந்து பதில் அளிக்கப்பட்டுவிட்டது.
8. நீங்கள் கொடுக்கும் அத்தனை விவரங்களும் யாரிடமும் பகிர்ந்து கொள்ளப்படமாட்டாது.
9. இந்த விவரங்கள் அனைத்தும் ஆராய்ச்சிப் பணிக்கு பயன்படுத்தப்படும்.
10. நீங்கள் கேட்டுக்கொள்ளும் பட்சத்தில் ஆராய்ச்சி முடிவுகள் உங்களுடன் பகிர்ந்து கொள்ளப்படும்.

தேதி: **கலந்து கொள்பவரின் கையொப்பம்**

APPENDIX V A

LETTER REQUESTING OPINONS AND SUGGESTIONS OF EXPERTS FOR ESTABLISHING CONTENT VALIDITY AND VALIDITY OF TOOL

FROM

Mrs . Andal M s c [N]
ASSO . Professer
Sacred heart nursing college
Madurai.

TO

SUB : Requisition for expert opinion and suggestion for content validity of the tool .

Respected Madam / Sir,

I am doing my **Ph .D** in nursing under Dr. MGR. medical university in sacred heart nursing college . In partial fulfilment of Ph.D in nursing degree I have selected the research topic mentioned below for the research project .i.e "Effectiveness of cardiac rehabilitation programme on Quality of life, Activity tolerance and selected physiological parameters [Heart rate , ECG] among CABG patients in selected hospital, Madurai".

With regard to this may I kindly request you to validate my content and tool for its relevancy. I am enclosing the objectives of the study. I would be highly obliged and remain thankful if you could validate and send it as early as possible.

Thanking you,

Yours faithfully,

P. Andal

Signature of the Guide

Enc:Research Content and Tool

APPENDIX V B

LIST OF EXPERTS WHO VALIDATED THE TOOL AND CONTENT

1. Dr.Nalini Jeyavanth santha M.sc (N) Ph.D
   Principal, Sacred heart nursing college
   Ultra trust,Madurai-20

2. Dr.Chandrakala M.sc (N) Ph.D
   Vice principal, Sacred heart nursing college
   Ultra trust,Madurai-20

3. Dr.Juliet sylvia M.sc (N) Ph.D
   HOD,Community Health Nursing Department
   Sacred Heart Nursing College
   Ultra trust,Madurai-20

4. Prof.Deva kirubai M.sc (N) Ph.D
   HOD-Fundamentals of nursing Department
   Sacred Heart Nursing college
   Ultra trust,Madurai-20

5. Prof.Thanga pappa M.Sc (N)
   Sacred Heart Nursing College
   Ultra trust Madurai-20

6. Dr .Ragunathan ,M . S.M.Ch
   HOD-Cardio thoracic surgery
   Government Rajaji Hospital
   Madurai-20.

7.Dr.Bala nayagam M . S.M.Ch
HOD-Cadio Thoracic Surgery
Government Rajaji Hospital
Madurai-20

8. Dr .Paul kumaran MD
HOD-ICMR Department
Government Rajaji Hospital
Madurai-20

9. Dr.S.S.Anna malaisamy MD
Cardio Thoracic Medicine
Senthil Clinic
Madurai-20

10. Dr.Thirumalai Kolundu subramanian.MD
Professor of medicine
Chennai Medical college Hospital
Irungalur Samaya puram
Trichy. 15

11. Dr.Janarthanan M.D.DM
Professor and HOD, Department of cardio thoracic medicine
Govt.Rajaji medical hospital
Madurai-20.

12. Dr.Rathna vel, M.S.M.Ch
HOD,Cardio Thoracic Surgery
Government Rajaji Hospital
Madurai-20.

APPENDIX V C

CERTIFICATE OF CONTENT VALIDITY

This is to certify that tool pamphlet and content constructed by **Mrs.Andal,** for **Ph.D** in Nursing, Sacred Heart Nursing College, Madurai affiliated to Dr. M.G.R. Medical University is validated by the undersigned and she can proceed with this tool and conduct the main study for the dissertation entitled "Effectiveness of Cardiac Rehabilitation Programme" on quality of life, activity tolerance and selected physiological parameters, (HR, ECG) among CABG patients.

Name

Signature

Place: Designation & Address

Date:

APPENDIX VI

TAMIL TRANSALITION

THE VALLIAMMAL INSTITUTION (TVI)
11/6, B.B. Road 2nd St., Pankajam Colony,
Madurai - 625 009, Tamil Nadu. ✆ 98942 49630; 98430 40226

VALIDATION OF TAMIL TRANSALTION

This is to Certify that tool and content prepared by Mrs. P. Andal, Associate Professor, Sacred Heart Nursing College, Madurai - 625 020 for her Ph.D thesis titled *'A study to assess the Effectiveness of cardiac rehabilitation program on activity, tolerance, selected physiological parameters and quality of life'* and translated into Tamil has found to be valid and correct.

THE VALLIAMMAL INSTITUTION (TVI)
11/6 B.B. Road
2nd St.,
Pankajam Colony,
Madurai-625 009.
Ph: 4210258

Madurai
02/01/2013

Dr. B. Ananthavalli
Director

APPENDIX VII

CERTIFICATE FOR ENGLISH EDITING

TO WHOMSOEVER IT MAY CONCERN

This is to certify that the thesis executed by Associate Professor. **P.Andal,Ph.D.,** scholar by Dr.MGR Medical university for Ph.D., in nursing on the topic on "Effectiveness of cardiac rehabilitation Programme on Activity tolerance, selected Physiological Parameters (HR,ECG) and Quality of life" under the guidance of **Dr.Nalini Jeyavantha Santha** was edited for the appropriate proper usage of language and found to be accurate.

(Dr. G. JEYAKUMAR)

Dr. G. JEYAKUMAR,
M.A.,M.Phil.,Ph.D.,PGDCA.,CGT.,
Assistant Professor, Dept. of English
Govt. Arts College
Melur-625 106, Madurai District

APPENDIX VIII A

TOOL 1

Modified Duke Activity Status Index

The Duke Activity Status Index is a self administered questionnaire that measures a patient' s func tional capacity.It can be used to get a rough estimate of a patient's peak oxygen uptake.

ITEM	ACTIVITY	YES	NO
1	Can you take care of your self(eating,dressing,bathing or using toilet) ?	2.75	0
2	Can you walk indoors such as around your house?	1.75	0
3	Can you walk a block or two on level ground?	2.75	0
4	Can you climb a flight of stairs or walk up a hill?	5.50	0
5	Can you run a short distance?	8.00	0
6	Can you do light work around the house like dusting,washing dishes or deskwork ?	2.7 0	0
7	Can you do moderate work around the house like sweeping floors or carrying in groceries or machine assemblies ?	3.50	0
8	Can you do heavy work around moving heavy furniture?	8.00	0
9	Can you do yardwork around moving heavy furniture ?	4.50	0
10	Can you have sexual relations?	5.25	0
11	Can you participate in moderate recreational activities like walking 4 km,bicycling 11m ph	6.00	0
12	Can you participate in strenuous sports like running 6 km?	7.50	0

Duke activity status index=

SUM(values for all 12 questions)

Interpretation

Maximum value 58.2

Minimum value 0

Estimated peak oxygen uptake in ml/mt

= (0.43*(duke activity status index) +9.6

APPENDIX VIII A

TOOL 2

SF-36 QUESTIONNAIRE

GENERAL HEALTH:

1. In general, would you say your health is:

☻ Excellent ☻ Very Good ☻ Good ☻ Fair ☻ Poor

2. Compared to one year ago, how would you rate your health in general now?

☻ Much better now than year ago

☻ Somewhat better now than one year ago

☻ About the same

☻ Somewhat worse now than one year ago

☻ Much worse than one year ago

LIMITATIONS OF ACTIVITIES:

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

3. Vigorous activities, such as running, lifting heavy objects

☻ Yes, Limited a lot ☻ Yes, Limited a Little ☻ No, Not Limited at all

4. Moderate, activities, such as moving a table

☻ Yes, Limited a lot ☻ Yes, Limited a Little ☻ No, Not Limited at all

5. Lifting or carrying groceries

☻ Yes, Limited a lot ☻ Yes, Limited a Little ☻ No, Not Limited at all

6. Climbing several flights of stairs

☻ Yes, Limited a lot ☻ Yes, Limited a Little ☻ No, Not Limited at all

7. Climbing one flight of stairs

☻ Yes, Limited a lot ☻ Yes, Limited a Little ☻ No, Not Limited at all

8. Bending, kneeling, or stooping

☻ Yes, Limited a lot ☻ Yes, Limited a Little ☻ No, Not Limited at all

9. Walking more than a mile

☻ Yes, Limited a lot ☻ Yes, Limited a Little ☻ No, Not Limited at all

10. Walking several blocks

☻ Yes, Limited a lot ☻ Yes, Limited a Little ☻ No, Not Limited at all

11. Walking one block

☻ Yes, Limited a lot ☻ Yes, Limited a Little ☻ No, Not Limited at all

12. Bathing or dressing yourself

☻ Yes, Limited a lot ☻ Yes, Limited a Little ☻ No, Not Limited at all

PHYSICAL HEALTH PROBLEMS:

During the past 4 weeks, have you have any of the following problems with your work or other regular daily activities as a result of your physical health?

13. Cut down the amount of time you spent on work or other activities

☻ Yes ☻ No

14. Accomplished less than you would like

☻ Yes ☻ No

15. Were limited in the kind of work or other activities

☻ Yes ☻ No

16. Had difficulty performing the work or other activities (for sample, it took extra effort)

☻ Yes ☻ No

EMOTIONAL HEALTH PROBLEMS:

During the past 4 weeks, have you had any of the following problems with your work or

other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious?

17. Cut down the amount of time you spent on work or other activities

☻ Yes ☻ No

18. Accomplished less than you would like

☻ Yes ☻ No

19. Didn't do work or other activities as carefully as usual

☻ Yes ☻ No

SOCIAL ACTIVITIES:

20. Emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

☻ Not at all ☻ Slightly ☻ Moderately ☻ Severe ☻ Very Severe

PAIN:

21. How much bodily pain have you had during the past 4 weeks?

☻ None ☻ Very mild ☻ Mild ☻ Moderate ☻ Severe ☻ Very Severe

22. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

☻ Not at all ☻ A little bit ☻ Moderately ☻ Quite a bit ☻ Extremely

ENERGY AND EMOTIONS:

These questions are about how you feel and how things have been with you during the last 4 weeks. For each question, please give the answer than comes closest to the way your have been feeling.

23. Did you feel full of energy?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little bit of the time
- None of the time

24. Have you been a very nervous person?
    - All of the time
    - Most of the time
    - A good bit of the time
    - Some of the time
    - A little bit of the time
    - None of the time
25. Have you felt so down in the dumps that nothing could cheer you up?
    - All of the time
    - Most of the time
    - A good bit of the time
    - Some of the time
    - A little bit of the time
    - None of the time

26. Have you felt calm and peaceful?
    - All of the time
    - Most of the time
    - A good bit of the time
    - Some of the time
    - A little bit of the time
    - None of the time

27. Did you have a lot of energy?
    - All of the time
    - Most of the time
    - A good bit of the time
    - Some of the time
    - A little bit of the time
    - None of the time

28. Have you felt downhearted and blue?
    - All of the time
    - Most of the time
    - A good bit of the time
    - Some of the time
    - A little bit of the time
    - None of the time

29. Did you feel worn out?
    - All of the time
    - Most of the time
    - A good bit of the time
    - Some of the time
    - A little bit of the time
    - None of the time
    -

30. Have you been a happy person?
    - All of the time
    - Most of the time
    - A good bit of the time
    - Some of the time
    - A little bit of the time
    - None of the time

31. Did you feel tired?
    - All of the time
    - Most of the time
    - A good bit of the time
    - Some of the time
    - A little bit of the time
    - None of the time

SOCIAL ACTIVITIES

32. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

- All of the time
- Most of the time
- Some of the time
- A little bit of the time
- None of the time

GENERAL HEALTH:

How true or false is each of the following statements for you?

33. Seem to get sick a little easier than other people

☻ Definitely true ☻ Mostly true ☻ Don't know
☻ Mostly false ☻ Definitely false

34. I am as healthy as anybody I know

☻ Definitely true ☻ Mostly true ☻ Don't know
☻ Mostly false ☻ Definitely false

35. I expect my health to get worse

☻ Definitely true ☻ Mostly true ☻ Don't know
☻ Mostly false ☻ Definitely false

36. My health is excellent

☻ Definitely true ☻ Mostly true ☻ Don't know
☻ Mostly false ☻ Definitely false

APPENDIX VIII B

TOOL 1

டியூக் செயல்படு நிலை விளக்க அட்டவணை (Duke activity status index)

மேற்பார்வை

நோயாளர்களின் செயல்திறனை அளவிடும் தன் நிர்வாக வினா வரிசைக் கேள்விகளை டியூக் செயல்பாட்டு நிலை விளக்க அட்டவணைக் கொண்டுள்ளது.

செயல் எண்	செயல்	ஆம்	இல்லை		
1	சாப்பிடுவது, உடை அணிவது, குளிப்பது, கழிவறைக்குச் செல்வது போன்ற வேலைகளை உங்களால் பார்த்துக் கொள்ள முடிகிறதா ?	2.75	0		
2	வீட்டின் உள்ளே அல்லது வீட்டைச் சுற்றிலும் நடந்து கொடுக்க முடிகிறதா ?	1.75	0		
3	ஒரு சந்து அல்லது இரண்டு சந்து தரைப்பாங்கான இடத்தில் உங்களால் நடக்க முடிகிறதா ?	2.75	0		
4	உங்களால் ஆகாய விமான படிக்கட்டுகளில் அல்லது மலை மீது ஏற முடிகின்றதா ?	5.50	0		
5	ஒரு சின்ன அளவு தூரம் உங்களால் ஓடமுடியுமா ?	8.00	0		
6	தூசி தட்டுவது பாத்திரங்களைக் கழுவுவது போன்ற இலேசான வேலைகளைச் செய்ய முடிகிறதா ?	2.70	0		
7	வீட்டைத் துடைப்பது, பெருக்குவது அல்லது பலசரக்குகளை எடுத்து வைப்பது போன்ற மிதமான வீட்டு வேலைகளை செய்ய முடிகிறதா	3.50	0		
8	வீட்டைக் கழுவுவது, கனமான மேசை, நாற்காலி மற்றும் கட்டில்களை நகர்த்துவது அல்லது தூக்குவது போன்ற கனமான வேலைகளை செய்ய முடியுமா	8.00	0		
9	ஆடு மாடுகளை பட்டியில் அடைப்பது, களை எடுப்பது அல்லது மின்களை எடுப்பாண்களை இயக்குவது போன்ற பணிகளை செய்ய முடிகிறதா ?	4.50	0		

10.	தாம்பத்ய உறவுகள் முடிந்ததா ?	5.25	0		
11.	மிதமான பொழுது போக்கு விளையாட்டுகளில் பங்கேற்க முடிகிறதா (நடத்தல், 4கி.மீ மணிக்கு, சைக்கிள் 11கி.மீ. மணிக்கு)	6.00	0		
12.	உங்களால் ஓடும் விளையாட்டு 6 கி.மீ மணிக்கு பங்கேற்க முடிகிறதா	7.50	0		

டியூக் செயல் நிலை விளக்க அட்டவணை

12 வினாக்களுக்கும் உரிய மதிப்பெண்களை கூட்டுத் தொகை பொருள்பட கூறுதல்

அதிகபட்ச மதிப்பு 58.2

குறைந்தபட்ச மதிப்பு 0

எடுத்துக் கொள்ளும் ஆக்ஸிஜன் அளவு மதிப்பீடு

= (0.43 x (டியூக் செயல் நிலை விளக்க அட்டவணை) + 9.6

APPENDIX VIII B

TOOL II

SF 36 கேள்விகள்

பொதுநலம்

1) பொதுவாக நீங்கள் ஆரோக்கியத்துடன் இருக்கிறீர்களா?

☐மிக மிக நன்று ☐மிக நன்று ☐நன்று

☐பரவாயில்லை ☐மோசம்

2) சென்ற வருடத்துடன் ஒப்பிடுகையில் இப்பொழுது உங்கள் பொதுநலத்தை எப்படி மதிப்பிடுகிறீர்கள்?

☐ஒரு வருடத்திற்கு முன்பைவிட இப்பொழுது மிகவும் பரவாயில்லை

☐சென்ற வருடத்தை விட ஓரளவு பரவாயில்லை

☐எப்பொழுதும் போல் ஒரே மாதிரியாக இருக்கிறேன்

☐சென்ற வருடத்தைவிட கொஞ்சம் மோசமாக இருக்கிறேன்.

☐சென்ற வருடத்தை விட மிகவும் மோசமாக இருக்கிறேன்

3) செயல் கட்டுபாடுகள் (Limitation of activities)

பின்வருவன நீங்கள் ஒரு நாளைக்கு செய்யக்கூடிய வேலைகளாக இருக்கலாம். இவ்வேலைகளை செய்வதற்கு உங்களது ஆரோக்கியம் உங்களைக் கட்டுப்படுத்துகிறதா? அப்படியெனில் எந்த அளவுக்கு

3) ஓடுவது, கனமான சாமான்களைத் தூக்குவது, வலுவான போட்டி விளையாட்டுகளில் பங்கேற்பது போன்ற சுறுசுறுப்பான திடமான செயல்பாடுகள்

☐ஆம் அதிகம் கட்டுபடுத்தும்

☐ஆம் ஓரளவு கட்டுபடுத்தும்

☐இல்லை எந்த அளவும் கட்டுப்படுத்தவில்லை

4) ஒரு மேசையை நகர்த்துவது, துடைப்பானைத் தள்ளுவது, குழிப்பந்து விளையாடுவது போன்ற மிதமான செயல்பாடுகள்

☐ஆம் அதிகம் கட்டுபடுத்தும்

☐ஆம் ஓரளவு கட்டுபடுத்தும்

☐இல்லை எந்த அளவும் கட்டுப்படுத்தவில்லை

5) பல சரக்குகளைத் தூக்கிக் கொண்டு அல்லது எடுத்துக் கொண்டு செல்வது

☐ஆம் அதிகம் கட்டுபடுத்தும்

☐ஆம் ஓரளவு கட்டுபடுத்தும்

☐இல்லை எந்த அளவும் கட்டுப்படுத்தவில்லை

6) பல உயரமான படிக்கட்டுகளில் ஏறுவது

☐ஆம் அதிகம் கட்டுபடுத்தும்

☐ஆம் ஓரளவு கட்டுபடுத்தும்

☐இல்லை எந்த அளவும் கட்டுப்படுத்தவில்லை

7) ஒருபடிக்கட்டில் ஏறுவது

☐ஆம் அதிகம் கட்டுபடுத்தும்

☐ஆம் ஓரளவு கட்டுபடுத்தும்

☐இல்லை எந்த அளவும் கட்டுப்படுத்தவில்லை

8)குனிவது, மண்டியிடுவது, தலையை தாழ்த்துவது

☐ஆம் அதிகம் கட்டுபடுத்தும்

☐ஆம் ஓரளவு கட்டுபடுத்தும்

☐இல்லை எந்த அளவும் கட்டுப்படுத்தவில்லை

9) ஒரு மைலுக்கு மேலாக நடப்பது

☐ஆம் அதிகம் கட்டுபடுத்தும்

☐ஆம் ஓரளவு கட்டுபடுத்தும்

☐இல்லை எந்த அளவும் கட்டுப்படுத்தவில்லை

10) பல சந்துகள் நடப்பது

☐ஆம் அதிகம் கட்டுபடுத்தும்

☐ஆம் ஓரளவு கட்டுபடுத்தும்

☐இல்லை எந்த அளவும் கட்டுப்படுத்தவில்லை

11) ஒரு சந்து நடப்பது

☐ஆம் அதிகம் கட்டுபடுத்தும்

☐ஆம் ஓரளவு கட்டுபடுத்தும்

☐இல்லை எந்த அளவும் கட்டுப்படுத்தவில்லை

2) குளிப்பது அல்லது தானாக உடை மாற்றுவது

☐ஆம் முடியாது

☐ஓரளவு முடியாது

☐இல்லை தடை எதுவுமில்லை

உடல் நல பிரச்சினைகள்

உங்களது உடல்நலக் குறைவின் விளைவாக கடந்த நான்கு வாரங்களில் நீங்கள் அன்றாடம் செய்த வேலைகளில் பின்வரும் பிரச்சினைகள் எதுவும் ஏற்பட்டது உண்டா ?

13)வேலை செய்வதற்கு எடுத்துக் கொள்ளும் காலத்தைக் குறைத்துக் கொண்டேன்

☐ஆம் ☐இல்லை

14) நீங்கள் விரும்பியதை விட குறைவாக சாதிக்க முடிந்தது

☐ஆம் ☐இல்லை

15) செய்யும் வேலைகளில் தடை இருந்தன

☐ஆம் ☐இல்லை

16) வேலைகள் செய்வதற்கு கடினமாக இருந்தன

☐ஆம் ☐இல்லை

உணர்வு நல பிரச்சினைகள்

மனச்சோர்வு அல்லது பதற்றம் போன்ற உணர்வுபூர்வமான பிரண்ணினையின் விளைவாக கடந்த நான்கு வாரங்களில் நீங்கள் அன்றாடம் செய்த வேலைகளில் அல்லது பிற வேலைகளில் பிரச்சினைகள் எதுவும் ஏற்பட்டது உண்டா ?

17) சாதாரணமாக வேலை செய்வதற்கு எடுத்துக் கொள்ளும் நேரத்தைக் குறைத்துக் கொண்டேன்

☐ஆம் ☐இல்லை

18) நான் நினைத்ததை விட குறைவாகவே செய்ய முடிந்தது

☐ஆம் ☐இல்லை

19) உங்களது வேலைகளை வழக்கம்போல கவனமாக செய்ய முடிகிறதா ?

☐ஆம் ☐இல்லை

பொது வேலைகள்

20) குடும்பம், நண்பர்கள், அயலவர்கள் அல்லது குழுக்களோடு சாதாரணமாக செய்யும் வேலைகளில் உணர்வு பூர்வமான பிரச்சினைகள் எழுந்தது உண்டா?

☐இல்லவே இல்லை ☐சிறிதளவு ☐மிதமாக

☐கடுமையாக ☐மிகவும் கடுமையாக

வலி

21) கடந்த நான்கு வாரங்களில் உங்களுக்கு உடல்வலி எவ்வளவு இருந்தது ?

☐ஒன்றுமில்லை ☐மிகவும் இலேசாக ☐இலேசாக மிதமாக

☐கடுமையாக ☐மிகவும் கடுமையாக

22) கடந்த 4 வாரங்களில் வலி எந்த அளவுக்கு வெளி வேலை மற்றும் வீட்டு வேலை உள்ளிட்ட உங்களது இயல்பான வேலையைப் பாதித்து உண்டா

☐இல்லவே இல்லை ☐சிறிதளவு ☐மிதமாக

☐அதிகமாக ☐மிக அதிகமாக

சக்தியும் உணர்வுகளும்

23) கடந்த 4 வாரங்களில் உங்களது உணர்வும் உங்களுக்கு இருந்த வேலைகளும் எப்படி இருந்தன பற்றிய வினாக்களுக்கு ஏற்ற விடைகளைக் கொடுங்கள்

முழு தெம்புணர்வு இருந்ததா?

☐எல்லா நேரங்களிலும் இருந்தது

☐பெரும்பாலான நேரங்களில் இருந்தது

☐கொஞ்ச நேரங்களில் இருந்தது

☐சில நேரங்களில் இருந்தது

☐மிக குறுகிய நேரங்களில் இருந்தது

☐எப்பொழுதும் இருந்ததில்லை

24) எளிதில் அமைதி இழக்கக்கூடியவராக அல்லது சினங்கொள்பவராக இருந்தீர்களா?

☐எல்லா நேரங்களிலும் இருந்தேன்

☐பெரும்பாலான சமயத்தில் இருந்தேன்

☐கொஞ்ச நேரங்களில் இருந்தேன்

☐சில நேரங்களில் இருந்தேன்

☐மிகக் குறுகிய நேரங்களில் இருந்தேன்

☐எப்பொழுதும் இருந்ததில்லை

25) எதுவும் உங்களுக்கு சந்தோஷம் கொடுக்க முடியாமல் மன சோர்வான போது நலிவு அடைந்தீர்களா? அல்லது தாழ்மை உணர்வு கொண்டீர்கள்

☐எல்லா நேரங்களிலும்

☐பெரும்பாலான நேரங்களில்

☐கொஞ்ச நேரங்களில்

☐சில நேரங்களில்

☐மிகக் குறுகிய நேரங்களில்

☐எப்பொழுதும் இருந்ததில்லை

26) ஓய்வையும் அமைதியையும் உணர்ந்திருக்கிறீர்களா?

☐எல்லா நேரங்களிலும் உணர்ந்திருக்கிறேன்

☐பெரும்பாலான நேரங்களில் உணர்ந்திருக்கிறேன்

☐கொஞ்ச நேரங்களில் உணர்ந்திருக்கிறேன்

☐சில நேரங்களில் உணர்ந்திருக்கிறேன்

☐மிகக் குறுகிய நேரங்களில்

☐ஒருபொழுதும் உணர்ந்ததில்லை

27) நீங்கள் நிறைய சக்தியிருப்பதாக உணர்ந்திருக்கிறீர்களா?

☐எல்லா நேரங்களிலும் உணர்ந்திருக்கிறேன்

☐பெரும்பாலான நேரங்களில் உணர்ந்திருக்கிறேன்

☐கொஞ்ச நேரங்களில் உணர்ந்திருக்கிறேன்

☐சில நேரங்களில் உணர்ந்திருக்கிறேன்

☐மிகக் குறுகிய நேரங்களில்

☐ஒருபொழுதும் உணர்ந்ததில்லை

28) மனம் நொந்து போன உணர்வு இருந்ததுண்டா?

☐ எல்லா நேரங்களிலும் இருந்தது

☐ பெரும்பாலான நேரங்களில் இருந்தது

☐ கொஞ்ச நேரம் இருந்தது

☐ சிலநேரம் இருந்தது

☐மிகக் குறுகிய காலம் இருந்தது

☐ஒரு பொழுதும் இருந்ததில்லை

29)நைந்து இத்துப்போன (பயனற்றுபோன)உணர்வு ஏற்பட்டதுண்டா?

நீங்கள் சந்தோஷமானவராக இருந்தீர்களா ?

☐எல்லா நேரமும் சந்தோஷமாக இருந்தேன்

☐பெரும்பாலான நேரம் சந்தோஷமாக இருந்தேன்

☐கொஞ்ச நேரம் இருந்தேன்

☐சில நேரம் இருந்தேன்

☐மிகக் குறுகிய காலம் இருந்தேன்

☐ஒரு பொழுதும் இருந்ததில்லை

30)களைப்புணர்வு இருந்ததா ?

☐எல்லா நேரமும் இருந்தது

☐பெரும்பாலான நேரம் இருந்தது

☐கொஞ்ச நேரம் இருந்தது

☐சில நேரம் இருந்தது

☐மிகக் குறுகிய நேரம் இருந்தது

☐ஒரு போதும் இருந்ததில்லை

31) நீங்கள் உங்களை சந்தோஷமான மனிதராக நினைத்திருக்கீறிகளா?

☐எல்லா நேரமும் இருந்தது

☐பெரும்பாலான நேரம் இருந்தது

☐கொஞ்ச நேரம் இருந்தது

☐சில நேரம் இருந்தது

☐மிகக் குறுகிய நேரம் இருந்தது

☐ஒரு போதும் இருந்ததில்லை

பொது வேலைகள் (Social activities)

32) கடந்த 3 வாரங்களில் உங்களது உடல் பிரச்சினைகளோ உணர்வு பிரச்சனைகளோ நண்பர்களை, உறவினர்களைச் சந்திப்பது போன்ற பொதுவான செயல்பாடுகளை எவ்வளவு காலம் பாதித்தது

☐எல்லா நேரமும் பாதித்தது

☐பெரும்பாலான நேரம் பாதித்தது

☐சில நேரம் பாதித்தது

☐மிகச் சிறிது நேரம் பாதித்தது

☐ஒரு பொழுதும் பாதிக்கவில்லை

பொதுநலம் (General Health)

33) பின்வரும் கூற்றுகள் எந்தளவுக்கு சரியாகும் / தவறாகும்?

மற்றவர்களை விட நான் மிக எளிதாக (விரைவாக) சுகவீனமடைவதாக தெரிகிறது

☐உறுதியாக உண்மை

☐பெரும்பாலும் உண்மை

☐தெரியாது

☐பெரும்பாலும் தவறு

☐உறுதியாக தவறு

34) எனக்குத் தெரிந்தவரை நான் நலமாகவே இருக்கிறேன்

☐ உறுதியாக உண்மை

☐பெரும்பாலும் தெரியாது

☐பெரும்பாலும் தவறு

☐உறுதியாக தவறு

35) எனது ஆரோக்கியம் மோசமாவதாக நினைக்கிறேன்

☐ உறுதியாக உண்மை

☐பெரும்பாலும் தெரியாது

☐பெரும்பாலும் தவறு

☐உறுதியாக தவறு

36) நான் மிகவும் ஆரோக்கியமாக இருக்கிறேன்

☐ உறுதியாக உண்மை

☐பெரும்பாலும் தெரியாது

☐பெரும்பாலும் தவறு

☐உறுதியாக தவறு

APPENDIX IX A

CONTENT ENGLISH

INTRODUCTION

Subject	:	Cardio Thoracic Surgery
Topic	:	Cardiac Rehabilitation
Method of Teaching	:	Demonstration, Return demonstration, Discussion, Lecture
AV Aids used	:	Flash card, booklet
Group	:	Post CABG surgery patients
Group or Individual	:	Individual
Time taken for teaching:		2 hours
Venue	:	Government Rajaji Hospital, Madurai

Aim:

To impart adequate knowledge to the CABG surgery patients, on cardiac rehabilitation and developing a positive attitude to perform cardiac rehabilitation at home care setup.

Objectives:

- To the objectives of the present study are to enable the post CABG patients and the significance of cardiac rehabilitation programme.
- To identify risk factors and mitigate them so as to adopt healthy life style
- To understand the importance of medication and maintain adherence.
- To achieve blood sugar, serum lipid and blood pressure control
- To improve functional capacity, return to work and leisure activities.
- To reduce physical and psychosocial stress
- To maintain regular medical follow up
- To minimize the risk of a heart attack
- To improve overall quality of life arts of bypass surgery
- To reinforce the importance of patient education in cardiac rehabilitation

Cardiovascular disease (CVD) contributed to 17.5 million deaths worldwide in 2005 (Nixon, 2011). World Health Organization (WHO) estimates that 16.7 million people around the globe die of Coronary Heart Disease (CHD) each year (American Heart Association [AHA], 2007). Almost 2.6 million Indians are predicted to die due

to CHD, which constitutes 54.1% of all cardiovascular deaths in India by 2020 (The Initiative for Cardiovascular Health Research in Developing Countries, 2007). The burden of CVD is increasing and it can only be reduced through modifying the risk factors. The established risk factors include lack of exercise, poor diet, and smoking. The emerging field of environmental cardiology addresses exposure to chemicals and other environmental substances that also have a profound impact on heart health (Froelicher and Myers, 2006). Reducing the risk of heart disease and prevention of another cardiac event and death should become the main focus in reducing the burden of CVD. Successful cardiac rehabilitation is the only solution for this challenge.

Cardiac rehabilitation is a process that restores optimal medical, physiological, social, and vocational performance following recovery from an acute cardiac event (Derstine and Drayton-Hargrove, 2000). The American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) and the AHA defined cardiac rehabilitation as coordinated multifaceted interventions designed to optimize a cardiac patient's physical, psychological, and social functioning, in addition to stabilizing, slowing, or even reversing the progression of the underlying atherosclerotic processes thereby reducing morbidity and mortality (Stephens, 2009).

The potential benefits of rehabilitation include an improvement in heart function, lowering of heart rate at rest and during exercise, and a reduced risk of dying or developing complications from heart disease.

The need for cardiac rehabilitation program is increasing due to stressful environment, physical inactivity and changes in dietary habits. Hence, it is imperative that the nursing professionals have to understand cardiac rehabilitation, its goals, benefits, core components, phases, and nurse's role in cardiac rehabilitation.

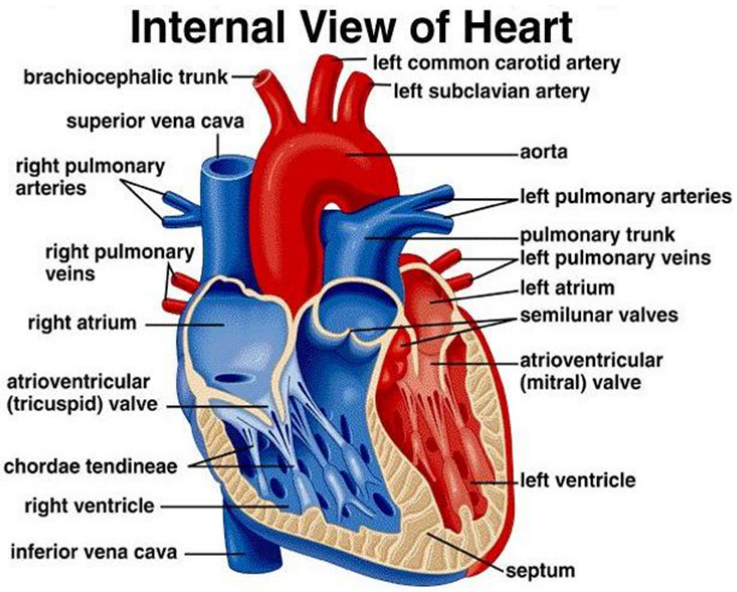
TEACHING INCLUDES

Educating the CABG patients on the Functioning of the Heart:

Heart is a pump made of muscle. It works non-stop throughout your life pumping blood around your body. Blood picks up oxygen from the air when one breaths and nutrients from the food one eats. Heart needs oxygen and nutrients too. It gets these from its own blood supply through the coronary arteries. Usually there is nothing wrong in the heart. Indeed, heart has the strongest muscle. Heart trouble starts where there are problems in coronary arteries in the form of blocks.

The heart is a four chambered hollow muscular organ, normally with the approximate size of the fist of the persons concerned. It is within the thorax and the mediastinal space that separates the right and left pleural cavities. Concisely the heart is composed of three layers, a thin inner lining endocardium, a layer of muscle called the myocardium and a fibrous layer called pericardium. A small amount of pericardial fluid lubricates and prevents friction between the surfaces as the heart contracts.

The heart is divided vertically by the septum. This creates a right and left sides. On each side there is an atrium ventricle. The thickness of each wall is different. The thickness of the left ventricle is necessary to generate the force needed to pump the blood into systemic circulation.



Source: Sylvia S. Mader, Inquiry in to Life, 8th edition, Copyright @ 1997 The McGraw-Hill Companies, Inc. All rights reserved

Arteries are blood vessels that carry oxygenated blood to all the organs of the body. Arteries are made up of three important layers, namely, inner (intima) middle (media) and outer (adventitia) layers. Arteries that carry oxygenated blood to the heart muscles are called coronary arteries.

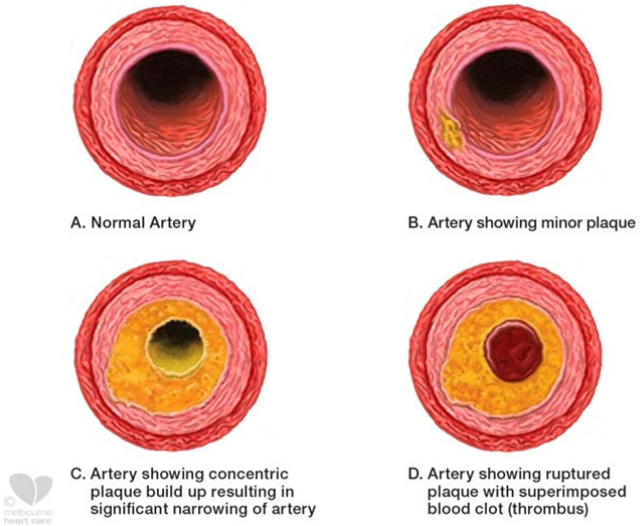
The intima is the inner most layer that lines the inside of the artery. The media is the thick layer made up mostly of smooth muscle. The adventitia is the outer

most covering that protects the artery from its surrounding. Healthy arteries are strong and elastic allowing the blood to flow freely through its lumen.

Atherosclerosis: (Development of Fatty Plaque inside the artery)

It is a disease that develops over time and causes the formation of fatty plaque buildup (atheroma) within the walls of an artery. An atheroma develops when there is damage to the internal layer of the artery, allowing WBC to evils the artery wall. (A) Once inside the artery wall, WBC transforms into foam cells and begins to collect fat and cholesterol. Overtime, this forms a lump called an atheroma. (B) This plaque may grow larger as muscle cells, fibers, calcium and cell debris are deposited. Also, the atheroma is prone to rupture and clotting, which may further limit the blood flow through the lumen (C).

Chart - 1



Thrombosis:

It is the formation of a clot within a blood vessel. It commonly occurs as a result of atherosclerosis. As a plaque grows in an injured artery, it may become unstable and cause cracking the intima layer. Blood clotting cells attach to the

injured site in an attempt to repair the break in the intima. A thrombus (clot) may quickly develop and grow to block the entire artery lumen.

Atherosclerosis may occur in large and medium sized arteries anywhere in the body and reduce blood flow to the organs served by the artery.

Some of the heart disease risk factors include high blood pressure, smoking, high blood cholesterol, diabetes mellitus, stress and physical inactivity. These factors speed up the narrowing of coronary arteries.

When ever body needs more blood – usually when one exerts, the heart has to pump harder and needs more blood. The heart muscle pump suffers when it does not get required supply of blood it needs. This is manifested as angina pain. The pain usually gets better with restard nitrate drugs like (glycerol nitrate). Emotional upset and extremes of temp can also cause anginas pain. A heart attack happens when part of the coronary arteries become blocked. Part of the heart muscle does not get its blood supply and is damaged. Rest or nitrate tablets does not relieve pain caused by a heart attack.

Some of the surgical procedures can be done to help to treat coronary heart disease. Angioplasty i.e., stretching of an artery and putting instants (a metal tube to hold open the artery) are ways to reopen the arteries that have narrowed CABG.

Coronary Artery Disease (CAD):

The coronary artery bring oxygenated blood and nutrients to the heart muscle. Blocked coronary arteries may cause chest pain and a heart attack.

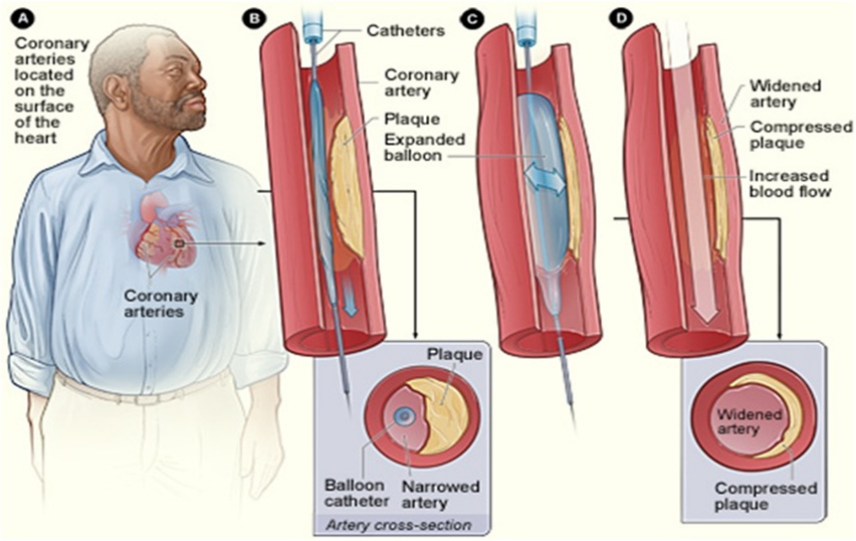
Coronary Artery Bypass Graft (CABG):

CABG is a procedure commonly used when coronary artery disease has affected multiple cardiac vessels. During the surgical procedure a healthy blood vessels from the chest wall or leg is used as the bypass graft. This creates a new un obstructed path for the blood to bypass the blocked area and brings oxygen rich blood to heart and muscle. Typically this procedure is performed on multiple blocked coronary arteries at the same time

Common areas of Blockade:

- ❖ Right coronary artery
- ❖ Left coronary artery
- ❖ Circumflex artery
- ❖ First diagonal branch
- ❖ Anterior interventricular artery.

Chart - 2



SPECIAL CARE AFTER CABG SURGERY

1. WOUND CARE

It is normal for spots or raw areas to develop on the wound as it starts healing. When it heals the red scav shrinks to a thin white line. You may notice a slight bump at one top of your chest wound. This should gradually disappear, but one may experience pain on the side of your wound. Wound healing may take 3-4 months.

Leg wounds: When a leg vein is used in bypass surgery, it is common to feel numbness or prickling along the wound and around the ankle. This is due to nerve recovering. It may take several months to settle down. It is also normal to get swelling leg and ankle. This usually gets better after about 3 months when other blood vessels take over the work of the missing vein. In the meantime, try to keep leg up when sitting. Being active helps the circulation.

Support stockings: Wearing a support stocking may prevent swelling in leg. Your doctor or nurse will tell you if this would help and you may be given stockings when you are in hospital. You should wear the support stockings for five to six weeks after your operation. Wear them all the time during the first week. Then wear them for 12 hours each day. They are tight and difficult to take on and off. Using a plastic bag helps. You will be shown how to do this in hospital.

Mammary Artery: If this artery was used for your by pass you may feel a sharp pain or ache in the chest. Numbness or tingling or hot and cold feelings may be there for 6 months or more around the left side of your chest. You may find that you skin is very sensitive in this area. This is quite normal. It is duet to the nerves in your chest recovering from the surgery.

Muffled hearing or thumping sensations in your chest, head or ears: If this happens in bed, change your position. It will settle in a few weeks.

Pain: It is normal to experience aches, pains, stiffness and numbness in your back, neck, shoulders, arms and chest after your operation. This is because of the effect of the operation on your muscles and ligaments, and due to your wound healing. This will improve, but can take up to six months or more to recover.

STERNOTOMY

- A warm shower every day.
- Don't rub the area
- Don't apply anything.
- Don't expose to sunlight for at least one year.
- Avoid heavy lifting and extreme shoulder movements for 6 – 8 weeks.
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CARE OF VEIN HARVESTED AREA:

- Vein harvested area should be supported with elastic stockings.
- Don't cross your legs. It obstructs the blood flow.
- Don't sit in the same position for a long time.
- When you sit, elevate your leg.
- Most wound infection may develop after 14 days of the surgery. It any symptoms like Fever , pain around the incision, rapid heart rate, reddened

skin, pus and bleeding around the skin occurs, immediately seek the help of the doctor.

2. ABDOMINAL BREATHING:

Prerequisites:

Assume a comfortable semi sitting positions in bed or chair or a lying position with one pillow.

Purpose:

- To tighten the abdominal muscles.
- To develop control over breathing

Get into a comfortable position, either sitting upright with head supported or lying on back. Loosen and tight, constricting clothing, especially around neck and waist.

Close eyes and place your left hand on abdomen and your right hand on your chest. Breathing normally, notice which hand moves as breathe.

Mentally, count from 1 to 4 slowly as you inhale through nose. Pause for two counts. Then open mouth and mentally count from 1 to 6 (or 1 to 8 if comfortable) as you exhale through your mouth.

As you continue breathing this way, try to shift most of the movement towards lower hand. Consciously, let abdomen push hand out as you inhale and pull the abdomen in, letting hand move in as you exhale.

After several minutes of slow, rhythmic breathing, let hands slowly move to sides as your abdomen continues to move freely in and out with each breath.

3. COUGHING TECHNIQUE:

It is to be performed for 3 days.

Purpose:

Effective coughing helps to dislodge lung secretions, hence prevents lung complications.

Guidelines:

- First, be seated in a chair, or on the edge of bed.
- Support incision before cough.
- Place one hand above and one below the incision bend body slightly forward, and take several slow, deep breaths.
- Then bend head forward and cough two to three times in rapid succession. Breathe deeply again and repeat the entire exercise several times.
- Supporting the chest is important and remember to do it. The more cough, the better it is to help clear lung secretions.
- Do not be afraid to cough: The chest wound will not give way.

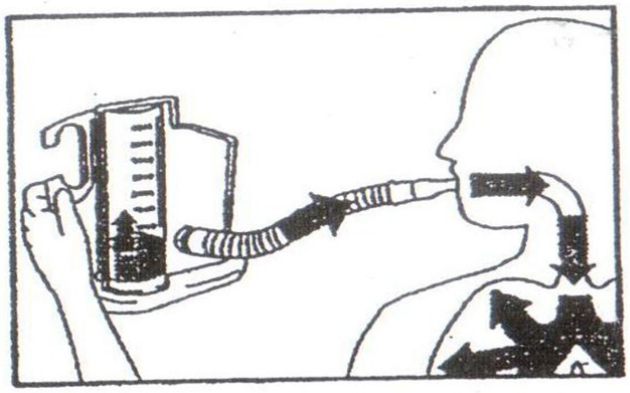
4. INCENTIVE SPIROMETRY

It may be used for 3 days.

This is a breathing exercise designed to help take long, deep breaths. Since it makes breathe deeply, it improves ability to clear mucus from lungs and increases the amount of oxygen delivered to lungs.

Spirometry will decrease the chances of developing lung problems following surgery especially if you have a history of smoking or other lung disease.

You should use incentive spirometer every 2 hours while are awake. Make sure it is kept in a place where can reach it easily.



Purpose:

- To improve pulmonary ventilation
- Counteract the effects of anesthesia
- To loosen respiratory secretions

Using an incentive spirometer:

- Hold or place the spirometer in an upright position
- Exhale normally
- Seal the lips tightly around the mouth place
- Take in a slow, deep breath to elevate the balls or cylinder and hold the breath for two seconds initially, increasing to six seconds to keep the balls or cylinder elevated as much as possible.
- For a flow oriented device, avoid brisk, low volume breaths that swap the balls on the top of the chamber. Greater lung expansion is achieved with a very slow inspiration than with a brisk, shallow breath, even though it may not elevate the balls or keep them elevated while hold breath sustained elevation of the balls ensures adequate ventilation of the alveoli.
- If you have difficulty breathing only though the mouth, a nose clip can be used.
- Remove the mouth piece and exhale normally
- Cough after the incentive effort. Deep ventilation may loosen secretions, and coughing can facilitate their removal normal
- Relax and take several breaths before using the spirometer again
- Repeat several times then 4 or 5 times at home.

- ❖ Clean the mouth pieces with walk in as directed and shape it dry.

5. STRESS:

Heightened stress levels can quite literally break heart. When you experience stressful situation in the life the death of a loved one, breaking away from a long term relationship, recovering from a tragedy or spacing intense failure, learning to deal with stress, even the minor irritant start clattering our daily life is crucial. Have some sort of outlet to release stress.

The mind decides the position of the stress pendulum on the positive or negative side. If it swings to the negative side it triggers more hormones released directly into the blood. This leads to high blood pressure and if maintained for long, leads to elevation of bad cholesterol and decrease in the good cholesterol HDL.

Negative stress, leads to over eating and thereby obesity. Sedentary life, smoking and alcohol add to the problem. These trigger excess release of free radicals not damage body tissues.

Finally this culminates in the narrowing of coronary arteries by the following mechanism. Narrowing of the coronary arteries due to erosion of plaque results in spasm. It is a temporary cessation of blood supply to the heart either independently or in combination resulting in heart attack. Learn to deal with stress. Have some sort of outlet to release stress and help yourself.

Stress Relief:

- Starting an art project (oil paint, sketch, create a scrap book or finger paint with grandchildren).
- Taking up a hobby, new or old (cooking, knitting, tailoring, computer, learning new skills)
- Reading a favorite book, short story, magazine or newspaper.
- Having coffee or a meal with friends.
- Listen to music during or after you practice relaxation.
- Taking a nature walk — listen to the birds, identify trees and flowers.
- Making a list of everything you still want to do in life.
- Watching an old movie on TV
- Playing cards or board games with family and friends.

6. PROGRESSIVE MUSCLE RELAXATION:

Definition:

It is a relaxation technique that involves tensing and relaxing different muscle groups in coordination with breathing. It can be done everyday.

Purpose:

- To eliminate tension from the body
- To feel a deep sense of relaxation

Pre Requisite:

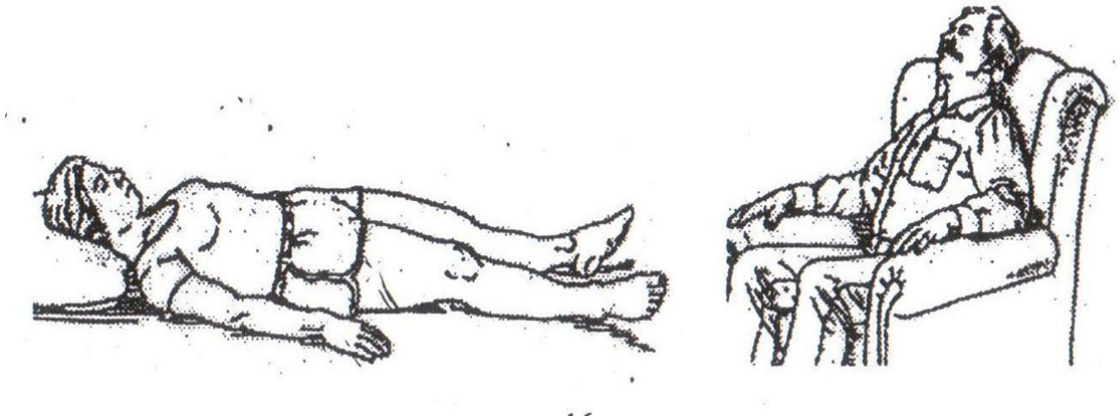
- The person should concentrate fully on what one is doing without allowing any other thoughts to interrupt.
- One should not fall asleep
- Wear comfortable clothing during relaxation
- One should breath normally without taking a deep breaths
- Concentration should be only on the part of the body which is engaged in tensing & relaxing.
- Get into a comfortable position with head and neck supported, another close your eyes and stretch up each muscle group listed below to about 25-50% of its maximum capacity.
- Hold the tension for a few seconds, and continue to breathe, then slowly release the tension.

Procedures:

1. Hands and arms – tense, hold slowly release, pause and focus
2. Face – tense, hold, slowly release, pause and focus.
3. Neck and shoulders – tense, hold, slowly release, pause and focus
4. Stomach and abdomen – tense, hold, slowly release, pause and focus
5. Buttocks and thighs – tense, hold, slowly release, pause and focus.
6. Calves – tense, hold, slowly release, pause and focus.
7. Feet – tense, hold, slowly release, pause and focus.

After Care:

- Sit quietly for several minutes and enjoy the feeling of a relaxed body before slowly opening your eyes. Focus on your surroundings.



7. DIABETES MANAGEMENT:

- ❖ Maintenance of normal blood glucose is essential. The meal should contain the following major food groups.
    - Bread, cereals (rice, wheat, ragi)
    - Fruits & vegetables
    - Milk & meat
    - Dhal & nuts
    - Fats, oils & sweats

For diabetes mellitus complex carbohydrates should be taken more. Limit the item containing fat, oil & sweets. This should be reduced to prevent risk of cardiovascular disease.

- ❖ Tight control can be achieved by losing weight, managing the diet, exercising, monitoring glucose, taking the medication as prescribed.

Avoid:

- Papads, pickles, sauces, & ketchups
- Salted chips, popcorn, biscuits
- Property drinks like bournvita, horliks.
- Baked products cakes/puffs
- Instant mixes
- Tinned & canned foods.

Diabetic Diet:

Food	Best Choices	Limit or avoid
Cereals	All cereals rice, wheat, ragi contain some amount of starch. The type of cereals is not important. Only the quantity that is taken matters. Among the biscuits-marie biscuit is the best, Brown bread is preferred then white bread.	Avoid maida, white bread, noodles
Pulses	Use sprouted forms	
Vegetables	Use freely, as fresh as possible.	
Fruits	Orange, apple, papaya 2 slices, guvava-1, water melon 2 slices.	Restrict banana, mango, jack fruit
Dairy products	Skimmed milk, tea, coffee, curds butter milk	Avoid whole milk, milk products
Nuts & Oil seeds	Groundnuts may be in limited quantity as it is high in protein & fat	Almonds, cashews
Fat & oils	Use minimally only PUFA like sunflower, safflow, gingelly, corn oil	Avoid coconut & palmoil, ghee, butter, dalda, vanaspathi
Meat	Small portion of chicken without skin, fish, lean meat	Red meat, Avoid fried meat
Egg	Egg white	Egg yellow

8. DIETERY MANAGEMENT: (Cardiac Diet)

Dietary Management (Low fat, Low salt diet):

- Consume a diet rich in fruits and vegetables
- Consume fish twice a week (salmon). These are good source of tuna (canned or fresh) omegh 3 futty acids. These acids helps to protect heart from blood clots & inflammation.
- Choose foods high with insoluble fiber of whole grain, cereals, oat meal & wheat bran, fruits such as apple, bananas, oranges & legumes such as beans, peas.

Mild sodium restriction [2-3 g/day] salt may be lightly used in cooking .
Salty processed foods [Chips , pickles] are to be avoided.
Moderate sodium [1g/day] No salt is to be added.

Cut back on salt:

- ❖ Limit canned, tinned, packaged and fast foods.
- ❖ Don't add salt to your food at the table
- ❖ Choose and prepare foods with little or no added salt. Aim to eat 1500mg.

Foods low in sodium (2.3 gms).

- Bread (whole grain)
- Cereals
- Pulses
- Dried beans
- Dairy products
- Fats & Oils
- Tomato & fresh fruits & vegetables

Foods to avoid (Processed):

- Biscuits
- Buttermilk
- Processed tomato sauce
- Beans or peas
- Suggestions to decreased sodium
- Reduce salt in cooking (garlic, lemon, onions instead)
- Low sodium tomato products
- Do not add salt to food while cooking or before eating
- Fresh fruits and vegetables are generally low in sodium

Dietary fibre- water soluble fibre have significant cholesterol lowering effect. (eg. Oats, whole grain)
Omega 3 fatty acid which are mostly found in sea food has protective function.

Fruits may be help in to relieve constipation.

Cholesterol and fats are essential nutrients in your diet but both relate to the risk of heart disease. Cholesterol is a fatty substance found only in foods of animal origin such as red meat, shellfish, organ meats such as liver, heart ,brain and whole milk and milk products .

There are 3 types of fats which can have a different effect on blood cholesterol

1. Saturated fats

   Dairy products (milk and milk products)

   Baked products (cakes, puffs)

   Chocolates

   Hydrogenated fats (dalda and vanaspathi)

   Coconut

   Coconut and palm oil

   Animal fat (red meat, shellfish, egg yolk, organ meats)

   Saturated fats obtained from food raise the cholesterol level s and are harmful. There fore it is wise to reduce your intake of saturated fats

   2. **MONO SATURATED FATS**

   Olive oil, mustard oil, Ground nut oil and sesame oil. Mono saturated fats do not alter the cholesterol levels in the body

   3. **POLY SATURATED FATS**

   Predominate in vegetable oils like sun flower oil. Poly saturated fats are beneficial since they lower the body cholesterol.

FOODS TO BE TAKEN	**FOODS TO BE AVOIDED**
Milk with out cream	Milk with cream
Tea	Ice cream
Egg white	Egg yellow yolk
Smashed potatoes	Fried potatoes
	Fried vegetables
Cooked vegetables	Cream soup
Clear soup	Butter
Sun flower oil	Coconut oil
Popcorn	CHIPS
Sesame oil	Mutton with liver

Fish, chicken without skin

9. SEXUAL ACTIVITY:

Sexual problems after a bypass surgery are common. Both men and women may have less sex. A variety of factors may contribute, including side effects of drugs, depression. Nitrates tablet can be helpful during sexual relationship. It is advisable 4-5 weeks after surgery. Avoid caffine, tea & heavy meals during sexual activity. Various positions may be helpful for sexual activity.

10. RETURNING TO NORMAL WORK / OCCUPATION:

Driving a car or 2 wheeler for 12 weeks after surgery is possible. Train / Air journey is safe after 10 days of surgery. May go to work 6-8 weeks depending on the nature of work and hours.

Bath / shower Straight away – a bath may be more tiring than a shower.

Cooking: When you feel ready you may cook. Avoid heavy pans to start with.

Cycling: After 6-8 weeks, excellent for your heart.

Decorating: Light – 6 weeks, heavy – 12 weeks.

Buildup your activities day by day. Do things that you enjoy.

11. FOLLOWUP:

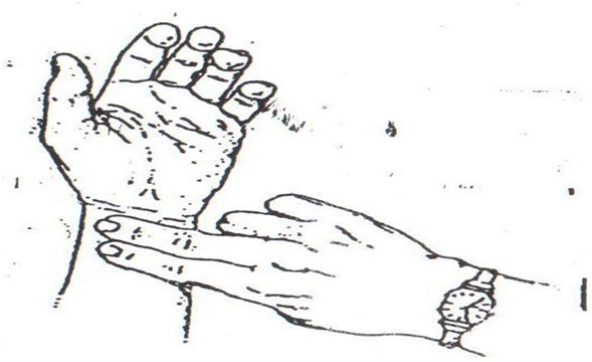
It is important to schedule and attend periodic visits to the hospital for follow up. Doing RC, ECG may be helpful to understand your heart functioning. Blood tests help to understand cholesterol level. Followup care is essential to prevent chest pain, heart attack and heart failure. Returning to normal work one month after CABG surgery is advisable.

12. MEDICATION:

Take medications as prescribed by doctor. If you have side effects of medication like vomiting, GI disturbance, giddiness, confusion, skin reaction, bleeding persists, immediately see the doctor. Using soft tooth brushes, wearing chappals while going out may be helpful. Avoid excessive stress and strain. If chest pain persists, nitrate tablets may be helpful.

13. COUNTING OF PULSE / HEART RATE:

Checking the pulse is very important part of exercising effectively. To check pulse use two fingers and press lightly at the pulse point. The rapid pulse may be the easiest to feel and is located at the base of the thumb near the wrist. Once you have found the pulse, count the number of pulsation feel during a 6 second period. Add a zero to that number and know heart rate for one minute.



14. SMOKING CESSATION:

It increases the incidence of coronary spasm and ischemic episode in patients with coronary artery disease. Any amount of smoking, even light smoking or occasional smoking damages the heart and blood vessels. Second hand smoke also can harm the heart and blood vessels. It contains harmful chemicals that people inhale when they smoke. Quitting smoking will reduce risk of developing second heart attack. Not smoking is an important part of healthy life style.

15. SUKHASAN:

Purpose:

This is a simple asana related to meditation. One can sit comfortably for a sufficiently long period in this asana.

- It regulates the process of inhaling and exhaling
- Continuous practice of this asana brings peace to the mind

Technique:

- Be seated on the asana
- Stretch straight both of the legs

- Place one foot under the other knee and the other foot under the first knee
- The neck and spine should usually remain in gyan mudra. Keep the eyes closed with ease.
- Keep the mind steady and peaceful
- The process of inhaling and exhaling should remain normal.

EXERCISE THERAPY

- Exercise Protocol may be taken from John Radcliffe Hospital(Black Bird Leys NHS trust)
- Exercise may be done at life care cardiac rehabilitation centres.
- 5^{th} -7^{th} day of CABG surgery the exercise will be demonstrated & return demonstrated by the patient. After that exercise a diary will be given to each patient they need to follow up in home set up.

Exercise:

It is a type of physical activity. It is structured, plan repetitive movements that are done to maintain or improve one or more characteristics of physical stress.

Type of Exercise:

The exercise should use large muscle groups and include aerobic exercises like walking, jogging and stairclimting are some of example.

Frequency:

3-5 times a week.

Content & Duration:

Warm up 5-10 mts conditioning at least 20mts and 5-10 minutes cool down phase.

Intensity:

- Intensity will be increased as followed as every week as per the time table.
- Spending most of time lying or sitting down will not help your heart recover and could cause problems. Try to start as soon as you are settled back at home.

EXERCISE DIARY

Name: **Age:**

	Walking	**Stretching Exercise**	**Walking**
Week 1	5 Minutes	5 Minutes	5 Minutes
Week 2	5 Minutes	7 Minutes	5 Minutes
Week 3	5 Minutes	9 Minutes	5 Minutes
Week 4	5 Minutes	11 Minutes	5 Minutes
Week 5	5 Minutes	13 Minutes	5 Minutes
Week 6	5 Minutes	15 Minutes	5 Minutes
Week 7	5 Minutes	18 Minutes	5 Minutes
Week 8	5 Minutes	20 Minutes	5 Minutes
Week 9	5 Minutes	23 Minutes	5 Minutes
Week 10	5 Minutes	26 Minutes	5 Minutes
Week 11	5 Minutes	28 Minutes	5 Minutes
Week 12	5 Minutes	30 Minutes	5 Minutes

Prerequisite:

- Make sure that you have eaten a tight meal approximately 1-2 hrs before exercising.
- Do not eat full meal or completely empty stomach.
- Know your capabilities. Exercise regularly but do not exceed the levels that have been recommended to.
- Wear proper clothing. We recommend loose fitting, comfortable clothing that is appropriate to weather.

Walking is a great way of exercising you can go at own pace, and walk as far as you like. To start with, try a short walk. Choose a route that allows you to rest if you want to – a wall or bench to sit on. Bit by bit build up the length of walk. As you feel better, try walking up a slight slope or walk more briskly. You may aim to be walking 1 – 2 miles (about 30 to 60 minutes) or even 3 to 5 miles by six weeks after operation. However, everyone is different – plan your exercise schedule to suit your recovery.

- Shrug shoulders gently up to ears and drop them again six times.
- Draw circles with your shoulders backwards, using arms too – six times each side.
- Bend head from side to side taking ears to your shoulders – six times each side.
- Turn your head to look over shoulder – six times each side.
- Turn upper body from side to side gently loosening waist – six times each side.
- Standing straight, slide hands alternately down each leg in a side to side movement far enough to feel the stretch six times each side.
- Lift each knee as high as is comfortable six times each leg.
- Point heel out in front of body then point your toe back under body in a heel-toe action, six times each foot.

WARM-UP EXERCISES:

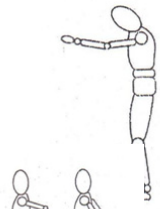
1. First Phase: Warm up

Walking, or marching on the spot create ways of raising your pulse. Do this for the first 5 minutes of the warm up, starting very gently and gradually increasing the intensity. The purpose is to warm up the muscles in preparation for stretching, and to increase the heart rate gradually

2. Stretching activities:

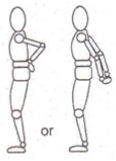
The next 5 minutes of your warm up should be to stretch the muscles that you are going to be using. Only stretch as far as muscles allow. It is important to remember to keep feet moving in between the stretches so that body remains warm and heart rate is still raised slightly, so maintaining the effects of the first 5 minutes of the warm up.

Upper back stretch



Lock your fingers together with arms stretched out in front. Lower head forward to look at the floor. Remember to keep feet moving. Hold the stretch for 10-15 seconds.

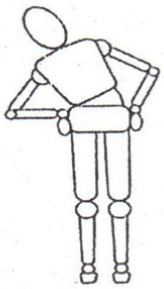
Chest stretch



Place hands on lower back. Gently move elbows towards each other. Keep back straight. Remember

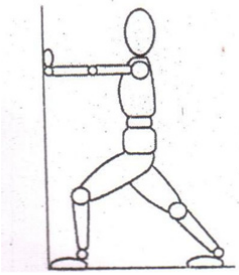
to keep feet moving. Hold the stretch for 10-15 seconds.

Lower back and waist mobility



Side bends. Stand with feet shoulder width apart either with hands on your hips or down by side. Slowly lean to one side from waist, being careful not to move hips. Come back to the upright position and lean to the other side. Repeat 5 times.

Calf Stretch

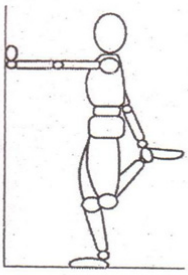


Press the heel of the back leg on the floor until a gentle stretch is felt in the calf muscle in the back of the lower leg. If a stretch is not felt, adjust the position by moving the back foot further back and hips forward. Hold the stretch for 10-15 seconds on each leg.

Hamstring Stretch

With one leg in front of the other, lean forward slightly, placing both hands on the hips. Straighten the front leg and slightly bend the back leg. Keep the head up and continue to lean until a stretch is felt in the back of the forward straight leg. Hold for 10-15 seconds. Repeat on the other leg.

Front of thigh stretch



Put your left hand on the wall for support. Lift right knee up in front and hold either right ankle, back of shoe or the back of trousers by ankle. Keep the supporting leg slightly bent throughout. Move knees together by lifting right foot behind the body. Keep the back straight and push the hip forward until a gentle stretch is felt. Hold the stretch for 10-15 secc repeat with the left leg.

Pulse raising (movement) activities

The final 5 minutes of the war up should be pulse raising activities at a slightly higher intensity than the first 5 minutes. The purpose is to continue to increase the heart rate in preparation for the main exercise session. Walking, marching on the spot, or low level cycling are suitable methods of pulse raising.

COOL DOWN:

It is important leave enough time at the end of session to cool down properly. Gradually lower pace during the cool down. The goal is to bring body back to its resting state.

- A thorough cool down for 10minutes reduces the risk of fainting or dizziness that could result from a sudden drop in blood pressure if you suddenly stop exercising.
- Cooling down also reduces the risk of disturbances in heart rhythm that could happen if stop exercising suddenly.

(These factors reduce the risk of sudden heart problems and should be taken very seriously)

- Stretching during the cool down also helps to reduce any muscle soreness that may be caused by the activity
- The cool down should be performed at a gradually slower speed. The aim is to bring body back to its resting state gradually.

APPENDIX IX B

CONTENT TAMIL

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, U j a j ; j p d ; c s ; S i w , U j a j ; j p d ; c s n s a k ; , i l a [i w j o d k h d j p R f ; f s h y h k ; b t s p a [i w k w w b t s p g g [w j ; j p y p U e ; J V w g L k ; M g j ; J f s p y p U e ; J , j a j ; i j g h J f h f ; f p w J / e y ; y j k d p

tYthftk; ,Gtpirj;jd;iknahLk;uj;jj;ij jilapy;yhkYk; clgFjpapy;brYj;JfpwJ/

uj;jj;jpy;bfhGgg[j;jptiyfs;milgLtjhy;uj;jf;FHha; RU';FfpwJ/ bfhGgg[j;jptiy cs;Siwnrjkilar;brafpwJ/ m)bts;isj;jpRmQqf;fis bry;fSf;Fs;mDgg[bfhGg;igak; bfhGgg[j;jptiyfisak;bkhj;j cUz;ilahf;FfpwJ/ M) ,e;j cUz;ilfs;bghpjhf cUthfp fhy;rpak;kwWk;eyptWw bry;fs; csnsj';fptpLfpwJ/ bfhGgg[j;jptiyfs;vspjhf ciwe;Jk; kwWk;tpLgl;L uj;j Xl;lj;ij jLf;fpwJ.

uj;jk; ciwjy; ,ja jkdpf;fSf;Fs;bfhGg[j;jptiyfs; cUthjyhy;eilbgWfpwJ/ ,J bghpjhf cUthfpuj;jf;FHhia nrjggLj;JfpwJ/ ,J epiyawWw cilaf;Toa khjphp jd;ikia cs;Sf;Fs; VwgLj;JfpwJ/ uj;j ciwjy; rPf;fukhf tshpe;J bkhj;j uj;j Xl;lj;ij ilia VwgLj;JfpwJ/

uj;jk; ciwe;J mJ nrjile;J jpRf;fSf;F brdWW filrpapy; rpd;d jkdpapy; clgFjpapy; fhwWld; Toa uj;jf;flpia cUthf;FfpwJ/ ,J uj;j Xl;lj;ij ilia VwgLj;jp Mf;rp$d;bry;tij jpRf;fSf;Fs;nrjggLj;JfpwJ/

,ja jkdp neha;uj;jj;jpRf;fSf;Fs; Mf;rp$d;bry;tij jilggLj;Jtjhy; milgl;l jkdp be"RtypiaakW; khuilg;igakW;VwgLj;JfpwJ/

,ja jkdp mWit rpfpr;ir bghJthf mjpfkhd uj;jf; FHha;fs;milgl;lhy;ntzpapUf;Fk/ ,J xdWW. ,uz;L. K:dWW

kwWk;ehd;F uj;j f;FHha;fSk; milggl;lhy; mWit rpfpr;irapd;
K:yk;uj;j Xl;lk;brYj;jggLfpwJ/

,e;j mWitr;rpfpr;irapd;ngh J uj;j Xl;lk; mspf;ff;Toa
fhy; my;yJ khhgfj;jkdpfspypUe;J. jkdp my;yJ rpiuapid
vLj;J ,ja jkdpfspd; milgl;l gFjpapd; fPH
bghUj;Jfpwhh;fs/ ,J milglhj xUg[jpa ghij ia cUthf;fp.
uj;jj;jpd; jpRf;fSf;Fs; Mf;rp$id brYj;Jfpwj/ tHf;fkhf
epiwa jkdpfs; milggl;lhy; ,e;j mWit rpfpr;ir
brapggLfpwJ/

bghJthf milgLk;,l';fs;

- tyJ ,Uja jkdp
- ,lJ ,Uja jkdp
- eLbtdhpfpy;jkdp
- RwWj;jkdp

1/ ,Uja mWit rpfpr;irf;Fggpwf ftdpf;f ntzpa Fwpgg[fs;

,jam Wit rpfpr;irf;F gpwF ftdpf;f ntzpait

Rhjhuzkhf g[s;sp my;yJ jpRf;fs; njhdw Mukgpj;J
tpl;lhy; g[z; Mwj;Jt';fp tpLk/ g[z; Mwpdhy; me;j ,lj;jpy;
rptgg[epwkhdJ btsis epwj;jpw;F khwp xU tpj Vwwj;njhL
,Uja mWitr; rpfpr;irf;F gpwF njhdWk/ ,J bfh";rk;
bfh";rkhf kiwe;J typ Vwgl;lhy;mJ g[z;MWtjw;fhd mwpFwp/
,jw;F 3?4 khj';fshFk/

fhy;gF j‰g[z;

fhy‰y; eukg[vL j;j‰Ue;j gF j‰a‰y; r‰y neuk; k j k j gg[F j;J t J nghdw c z h;t[b j h‰ayhk/ , J eukg[F z kht j w;F mw‰Fw‰/ , j w;Fk; xU r‰y khj ';f shFk/ , J F i we;j J 3 khj ';f S f;F g‰wF j hd; cU thFk/ mJ t i u mL j;j uj;j f;FHha;f s; , e;j mW i t r‰f‰r;i rg;gF j‰a‰D i la nt i y i a rh‰tur; braa‰k/ fhy‰i d rw‰W caukhf i t j;j y; ey;y uj;j Xl;l j;j‰w;F c j t‰ braa‰k/ xnu e‰i y a‰y;e‰i wa neuk;mkuf;T lhJ/

mW i t r‰f‰r;i r bra;j fhy‰i d Rw‰w‰ c i w m z‰t J tP‰;f j;i j F i wf;f c j t[k/ 5?6 thu';f S f;F , i j m z‰t J ey;y J/ K j y; thuj;j‰y; 24 k z‰neuKk; mL j;J 12 k z‰ neukht J m z‰e;j‰Uf;f nt z;Lk/ , J vggo m z‰t J vdgJ kUj;J tk i da‰nyna fw‰Wf;bfhL f;fggLk/

c ';f s; , j a j;j‰y; kh‰kh‰ Mh;l;lh‰ vdggLk; ,uj;j f;FHha; mW i ta‰d; nghJ gadgL j;jggl‰Ue;jhy; c ';f s; eukg[vL j;j gF j‰f s‰y; k j k j gg[(c z h;t‰d;i k) njhdwyhk/ , J t[k; , aygh d J jhd/

, j am W i t r‰f‰r;i r f;Fgg‰d; r‰y ehl;f s‰y; f‰s‰f; r j;j k; nf lgJ nghy; njhdwyhk/ , J t[k; r‰y thu';f S f;Fs; mwnt , y;yhky;ngha;t‰Lk/

c ';f s; njhs; gl;i la‰y; KJ f‰d; nkwg[w j;j‰y; r i ja‰y; ,W f;fk; , Ugg J nghy;njhdwf;TLk/ ehshf , J khw‰t‰Lk/ , e;j ty‰i af;F i wf;F bfhL f;fggl;l kUe;J f i s gadgL j;j yhk/

- ijay;lggl;l gFj;fis ehs;njhWk; nrhgg[nja;j;J btJbtJgghd eP;y; fGt[';fs; mGj;j;j njaggij jt;h;f;ftpk;/
- R{h;a xs;glhky;xU tUlj;j;w;F ghh;j;Jf;bfhs;stpk;/ R{h;a xs;gl;lhy;jGkg[bgh;jhfyhk;/
- eP;fs; kUj;Jth; brhd;dhy; xH;a ve;jt;j kUe;Jk; jlthjP;fs;/

ijay;lggl;l gFj;ia ghJfhj;jy;

- ijay;lggl;l gFj;fis ehs;njhWk; nrhgg[nja;j;J btJbtJgghd eP;y; fGt[';fs;/ mGj;j;j;njaggij jt;h;f;ftpk;/ ,ggFj;fs;y; bta;y; gl;lhy; gh;j;gg[Vwglyhk;/ Mfnt Xuhz;L tiu mggFj;a;y; mj;f R{h;a xs;glhky;ghh;j;Jf; bfhs;stpk;/ R{h;a xs;gl;lhy;jGkg[bgh;jhfyhk;/

mWit braa;aggl;Ls;s fhiy ghJfhj;jy;

c';fs;, ja mWit f;fhff;fhy;fs;y;, Ue;J eukg[vLf;fg; gl;bUe;jhy;g;d;tUtdtw;iwf;fUj;j;y;bfhs;S';fs;/

- ijay;lggl;l gFj;fis nkny Tw;athW ghJfhj;J bfhs;stpk;
- fhy;nky;fhy;ngh;L cl;fhuhjP;fs;/ mJ ,uj;j Xl;lj;ij jilbraa;apk;/
- xnu e;iya;y; eP;z;l neuk;cl;fhh;e;j;Ugg ijnah e;wg ijnah jt;h;f;ftpk;
- cl;fhh;e;j;Uf;Fk;ngh;J c';fs; fhiy caukhd xU ,Uf;if a;y; myyJ gyifa;nyh itj;Jf; bfhs;S';fs;/

gLj;Jf;bfhzpUf;Fk;ngh J fhiy cah;j;jp itggjw;Fhpa Vwgh Lfis bra;J bfhs;S';fs/

- fhypy; tPF;fk; ,Uf;fpwjh vdW ftdpj;Jf; bfhs;S';fs/ fhiy cah;j;jp itj;jt[ld; tPF;fk;Fiwa[k/ ePf;fs;epw;Fk; ngh J kPz;Lk; tPF;fk; njhdW k/ bjhlhe;J ,Ue;jhnyh nkhrkhdhnyh c';fs;kUj;Jtiuj;bjhlhg[bfhs;S';fs/

c';fs; ,jam Wit kUj;Jth;brhd;dhy;xHpa. mjd;nky; ve;jtpj kUe;njh. fspkn;gh vzpbznah jlthjP;fs/ xtpbthU ehSk; eukg[vLf;fggl;l fhaj;jpid ftdpj;Jf;bfhzpU';fs; gpd;tUgit Vjht J njhdwpdhy;kUj;Jtiu ehL';fs/

- eukg[mWit ijawgFjpmjpf bkd;ikahFjy;
- fhaj;jpd;Xu';fspy;tPF;fnkh rptgpngh njhdWjy;
- ijawgFjpapy;Vjht J frpt[njhdWjy;
- ,iltplhj fha;r;ry;

gf;ftpist[fs;

kUe;JfSf;Fg; gf;f tpist[fs; VwgLtJz;L vdgij ePf;fs; g[pe;Jf; bfhs;tJ Kf;fpakhd J/ gpd;tUk; gf;ftpist[fis vgpngh jhtJ njhdwpdhy; cldoahf c';fs; kUj;Jtiu ehL';fs/

- mjpfkhd the;jp czh;t[tapwpnwhw;l;lk; kyr;rpf;fy; tapwWty/
- the;jp
- epw;Fk;ngh J kaf;fk; ji y Rwwy;fpuf;fk;

- FHggk;
- fhy;iffsp;rpW Joggp[
- ehoj;Joggp[k;Fjpahjy;(myyJ)kfF;Fiwe;Jnghjy;
- njhspy;xt;thikfhuzkhf bghhpbghhpahfj;njhdpWjy;
- ,J tiuapyypyhj epiyapy; jpUudpW ,ujpjf; frpt[njhdpWjy;

2/ tapwpWRthrk;

eyypy epiyapy; clfhhpe;J bfhz;L c';fSila jiyapd; gpdgpwk; rha;j;J itj;Jf;bfhs;S';fs/ ,Wf;fkhd cilfis jsh;j;J tpL';fs/

fz;fis Kofpbfhs;stpk/ ,lJ ifia tapwpwpYk; taJ ifia khhgpYk; itj;Jf;bfhs;stpk/ K:RtpLkpnghJ ve;j iffs;efUfpwJ vdpWghh;f;ftpk/

1ypUe;J 4 tiu vz;zp K:r;ir ,Gj;J tpL';fs/ gpd;2 vz;Qqk; tiu epWj;jp tpltpk/ thia jpwe;j 1ypUe;J 6 tiu vz;Qqk;tiu K:r;irbtspapy;,Gj;J tpltpk/

,Jkhjph ,d;Dk; bjhlhe;J bra;J tyJ ifapy; (tapwpWggFjpapy) csnsjs;spkwpWk;,Gj;J K:r;irtpltpk/

bfh";r neujpjpy;rhd K:RbkJthf c';fs;tyJ ifapy; tapwpWggFjpapy;rhf czuKoapk/

3/ ,UKk;Kiw

,J K:dW ehl;fSf;F bjhlhpe;J braayhk/

,UKjy; c';fSila EiuaPypy; ,Ue;J njitawW mRj;jj;ij btspnawW cjtpk/

clfhhpe;J bfhz;L. gLf;if apd;Xuj;jpy; te;J bfhz;Lk; ,ijr; braayhk/ c';fSila ifia nkYk; fPBk; itj;Jf bfhz;L Fdpe;J bfhz;L epiwa K:r;ir csspGj;J tplTk/ gpd;dh;Kd;rhape;J 2 myyJ 3 Kiw ,UktpL/ mjd;gpd; K:r;ir ,Gj;J tplTk/

c';fSila khhgfj;ij ,Wf;fgpoj;Jf;bfhss;stpL/ epiwa ,UKjy; njitawW mRj;jj;ij EiuaPypUe;J btspf bfhzu cjtpk/

4/ Rthrggapw;rp

,J c';fSf;F ePBkhd.cs;jirfSf;F K:r;ir ,Gj;J tpl cjt[fpwJ/ ,J c';fSf;F K:r;ir ,Gj;J tpLtjhy; mRj;jj;ij EiuaPypy; ,Ue;J btspf bfhzutpL/ Mf;rp$d; msit EiuaPYf;F mjpfggLj;jtpL/

K:rRggapw;rp braytjhy; EiuaPy;rkge;jggl;l tpahjpfisf; Fiwf;f cjt[fpwJ/

,uz;Lkzpneuj;Jf;F xU jilt ,ij braantz;Lk/

braytiw

❖ K:r;ir ,Gj;J tplTk;

- tha;f;FHhia csnsns itj;J cjl;il K:ltk;
- K:r;ir bkJthf. MHkhf cs;s gj;J bjhlhe;J bra;J tutk/
- mjd; gd;dh; MHkhf cs;s gj;J. 3 td;hof;F itj;J ,Uf;ftk/
- mjdgd;dh; ,ij 10?15 ek;lj;jw;F braatk/ ,jy; bfh";rk;rhjhuz RthrKk; ,jd;eL ty;vLf;fyhk/
- ,jid Kof;Fknghj filrayl; K:r;ir ed;F cs;s Gf;f ntz;Lk/ gd;dh; 2?3 Kiw ,Uk ntz;Lk/ ty ,Ue;jhy; eP;fs; jiyaidia itj;J. ,UKknghJ mGj;jk; bfhLf;fyhk/

5/ kd mGj;jk;

kif mGj;jk; mikjahf ,jaj;ij ghj;f;Fk/ c';fs; thH;f;if ay; td;Ugg khd thd; kuzk; eP;l ehisa cwit Kwj;J ty f;f bfhs;tJ. Jf;fj;jy;Ue;J kP;L tUtJ my;yJ fLikahd njhy;t nghdw beUf;foahd my;yJ fLikahd njhy;t nghdw eiya y; ,jak; mGj;jj;jy; behW';F fwJ/ ,eiya y; rwa tcak; Tl bghjhf thH;f;if ia ghj;f;Fk/ mGj;jj;jy;Ue;J tLgl;l bts a y; my;yJ eP;fs; Xa;t[bgWtjw;F cjt braatk/

mGj;jk; vd;Dk; Cry; Fzpd; eiyia Mf;fkhdjh my;yJ vjhkiwahdjh ,jak; jP;khd f;fwJ/ Cry; Fz;L vjhkiwahf Cryhodhy; twhhnkhd; ,uj;jj;jy; fye;J ,uj;j mGj;jk; TLfwJ/ ,jaj;jy;Ue;J uj;j Xl;lk; jw;fhykhf

j i lgL f;wJ/ , J ey;y bfhGg;ig F iwj;J nj i tawpw bfhGg;ig mj;fggL j;J f;wJ/

vj;h;kd mGj;jk; mj;fk; rhgg;L j y; c lwgUkd; Xa;thd thH;f;if. r;fbul;g[if j;jy; kJ mUe;J j y; vyy;yh fhuz ';fSk; nj i tawpw bghUl;f i s Ruf;fr;bra;J c lkg[j; j;Rf;fS f;F gh j;g;ig VwgL j;J f;wJ/

,Wj;a;y; ,uj;j Xl;lk; j i lggl;L ,uj;j ehs j;Rf;fs; ms;f;fggl;L ,jaj;j;y; ty; VwgLk/ ,jaj;j;w;F uj;j Xl;lk; jw;fhy;fkhf j i lgL f;wJ/ kd mGj;jj;i j f; i fahs fwpWf; bfhs;S ';fs/

kd mGj;jj;j;y;Ue;J t;Lj i y

- ❖ f i y nt i yggh L f i s j; bjhl ';F ';fs; (Xt;ak; t z;zk; j;P;Lj y; bghk;ik bra;j y; T i l g;z;Qqj y)
- ❖ Xa;t[neuj;j;y; VjhtJ xU t;Uggkhd nt i y i a nkwpbfhs;S ';fs/
- ❖ t;Uggkhd E}y; r;Wf i j.bra;j;j;jhs;goa[';fs/
- ❖ e z gh;fS l d;fhg; my;yJ c z t[mUe;J ';fs/
- ❖ Xa;t[ga;w;r; bra;a[k;nghJ my;yJ bra;j g;d;dh; ,d;ikahd ghl;L f;nfS ';fs/
- ❖ ,aw;if R{Hy;y;e ilgga z k;nkwpbfhs;S ';fs;?gw i t fs;d; xy;f i s f; The;J f t d;a[';fs;, ku';f i sak[k; g{f;f i sak[k; , i t f z;L bry;Y ';fs/

- ❖ thH;f;if a‰y; eP;fs; braa t‰Ukg‰a xt‰bthd;iwa[k; gl‰ay‰l;L ghU';fs/
- ❖ bjhiyf;fhl;r‰a‰y;giHa r‰d‰khgl';fis ghU';fs/
- ❖ ezgh;fSld; my;yJ FLkg cwt‰dh;fSld; nrhe;J rP;L my;yJ gwit t‰isahl;L t‰isahlyhk/

6/ bjhlhe;J j‰Rf;fis jsh;j;Jk;ga‰w;r‰

tiuaiw

,J xU tifahd j‰Rf;fs‰d; ,Wf;fk; kw‰Wk; jsh;j;Jk; ga‰w;r‰ahFk/ ,ij j‰dKk;braa nt z;Lk/

ed;ikfs;

- ,J kd mGj;j j;ij Fiwf;f‰wJ
- cs;Sz h;it czh;t jw;F cjt[f‰wJ

nj itahd jahh;Kiw

- ,e;j ga‰w;r‰ia braa[k;ngh J ga‰w;r‰a‰y; kl;Lk; jhd; ftdj;ij itf;f nt z;Lk;
- ,ij braa[k;ngh J J}';ff;TlhJ
- ey;y trj‰ahd cilia mz‰e;J bfhs;snt z;Lk;
- rhjhuzkhf K:r;ir cs;s‰Gf;fyhk/
- ftdk; KGJk; K:r;ir ,Gj;J bts‰a‰y; t‰Lt j‰y; ,Uf;f nt z;Lk/

- eyy; epiyikapy; cl;fhhpJ fGj;J kwWk; jiy rhapj;jthW. fz;iz Kd fPH Twpathw 50 rjtPjk; tiu Koe;j mst[bra;atk/
- bfh";r tpdhofSf;F ,Wf;fp gpd;dh; Rthrk; bra;J gpd;dh; bkJthf jsh;j;jtk/

c';fSf;F trjpahf cl;fhhpJ c';fSila jiy kwWk; fGj;ijak; jsh;j;jpf; bfhs;stk/ fz;fis Kd fPH tUk; jpRf;fis ,Gj;Jggpoj;J gpd;dh;bkJthf jsh;j;jtk/

1/ iffs;kwWk; tpuy;fs;

2/ Kfk;

3/ fGj;J kwWk;njhygl;il

4/ tapW kwWk; tapwWj;ji rfs;

5/ fhy;fs;kwWk; fhy;jirfs;

6/ bfhz;ilf;fhy;jir

7/ ghj';fs;

cl;fhhpJ epiwa Kiwfs; ,ij bra;jhy; ePf;fs; jshpj;jkd epiyiacz UtPfs/ gpd;dh; fz;id jpwf;ftk/

7/ rh;f;fiuneh iaf;ifahSjy;

6 tifahd cz t[tiffs;cs;sJ/

- gpul; jhdpa';fs;(mhprp.nfhJ ik.uhfp)
- gH';fs;kwWk; fha;fwpfs;

- ghy;kwWk; , iwr;rp
- gUgg[kwWk;gaW tiffs;
- bfhGgg[kwWk; , dpgg[tiffs;
- rh;f;f iu tpahjpf;F fodkhf brhpf;ff;Toa kht[r;rj;ij vLj;Jf;bfhs;syhk;(v/fh/gHtiffs)
- vzbza;kwWk; , dpgg[tiffis Fiwj;Jf;bfhs;stk/ , J , janehiaf;Fiwf;f cjtk;
- vilf;fl;LgghL. czt[Kiw. Clwgapw;rpfs; rh;f;f iuapd; msitg; ghpnrhjpj;jy; kUe;Jfis kUj;Jthpd; mwpt[iuapdgo Kiwahf clbfhs;sy;nghdwit rh;f;f iu nehiaf;fl;Lgghl;loy; itj;jpUf;f cjtk/

rh;f;f iu tpahjpf;Fhpa rhgghl;L tiffs;

nrh;j;Jf bfhs;s ntzpait

- jhdpa';fs; mhpr. nfhJik. uhfp vy;yhtwwpYk; !;lhh;r; cs;sJ/ ve;j jhdpak; vLj;jhYk; vLf;ff;Toa mst[jhd; Kf;fpak/
- nkhp gp!;fl;rpwe;j czt[gpbusd;gpul;bts;is gpul;ilf; fhlpYk;rpwe;jJ/
- Kisflpagapw tiffs;ey;yJ
- fha;fwpfis jhuhskhf clbfhs;syhk/
- Mu"R. Mggps; gggps; (2 Jz;Lfs). bfhapahggHk; jhg{rzp (2 Jz;Lfs) vLj;Jf bfhs;syhk/
- Mileh;f;fa ghy; Ofhgp. nkhh; japh;clbfhs;syhk/

- f l i ygUgg[bfh";rk;kl;Lk;rhgglyhk;
- Xhd bfhGgg[bghUshd R{hafhe;j v z bza; eybyz;i za; kwWk;nrhs v z bza;nrh;f;fyhk;
- nfhH njhy; chj;jJ kl;Lk; kd; kwWk; Kl;il bts;isf;fU nrh;j;J fbfhs;syhk/

jthf;fntz;a bghUl;fs;

ikjh. E}Ly;!; thHggHk; khkgHk; gyhggHk; Mila[ila ghy; kwWk; ghy; bghUl;fs; Ke;jhggUgg[ghjhkgUgg[nj';fha; vz bza; gid vz bza; bea; lhy;lh. td!gj. rtgg[khkrk; Kl;il k";rf;fU. kwWk;bghhj;j khkrk/

CWfha; mggsk; rh!; kwWk; bfl;rR{g; rg;!; ghg;fhh;d; g!;fl; nghh;d;tl;lh. twhh;yf;!; nff;kwWk;gg;!; gjggLj;jggl;l bghUl;fis jthf;f;ftk/

8/ czt[f;fl;LgghL

- cgg[kjkhf 2?3fuhk;xU ehisf;F cgnahf;f;ftk;
- cgg[mjfkhf cs;s rg;!; CWfha; jthf;f;ftk;
- mjf cgg[fl;LgghL ,Ue;jhy;1f myyJ cgg[,y;yhky; rhgglgHfbfhs;stk;
- ehh;r;rj;J cs;s bghUl;fSk;bfhGg;ig Fiwf;f cjt[fwJ/ (Xl;!; KG jhdha';fs)
- gH';fs;c';fS ilakyr;rf;fis jthf;f cjt[fwJ/ Fiwe;j cgg[(2?3f-ehSf;F)

k‰f f;F iwe;j cgg[(1f‰-ehS f;F)

cg;igf;F iwggjw;F

- nfd;od;gjggLj;jggl;l kw;Wk; Jh‰jgbghUl;fs;
- cg;ig ild‰';nlg‰s;kH iti f;ff;TlhJ
- vgbghGJk;F iwe;j msT[cg;ignac z t‰y;nrh;f;ftl;k;

cgg[(2?3f‰) cs;s bghUl;fs;

- g‰ul;
- jhd‰a';fs;
- gUgg[
- cyhe;j gH';!;
- j‰drh‰ bghUl;fs;
- bfhGgg[kw;Wk;vz bza;
- jf;fhs‰. fha;fw‰ kw;Wk;gH';fs;

jt‰h;f;fnt z bpait

gH';!; gl;lhz‰. gjggLj;jggl;l g‰!;fl; nkhh; jf;fhs‰ R{g; Xl;!;bfhGg;ig Fiwf;Fk; jd;ikaL[s;s J/

உணவுமுறைகளைக் கையாளுதல்

கொலஸ்ட்ராலும் கொழுப்பும் இதய நோய்க்கும் ஆபத்தானவை. கொலஸ்ட்ரால் இறைச்சி உணவுகளான மாட்டிறைச்சி, சிப்பி நண்டு (Shell Fish) ஈரல், மூளை இதயத்திலும், பால் மற்றும் பால் பொருட்களிலும் அதிகமாக இருக்கிறது.

மூன்று விதமான கொழுப்புகள் உள்ளன. அவை இரத்தத்தில் உள்ள கொலஸ்ட்ராலில் மாறுபட்ட தாக்கத்தை ஏற்படுத்துகின்றன.

கரையாத கொழுப்பு (பூதை கொழுப்பு) - Saturated fat

பால் பண்ணை பொருட்கள் (பால் மற்றும் பால் பொருட்கள்)

பேக்கரி பொருட்கள் (கேக், பப்ஸ்)

டால்டா, வனஸ்பதி

தேங்காய்

தேங்காய் எண்ணெய், பனை எண்ணெய்

மாமிச கொழுப்பு, முட்டை மஞ்சள் கரு, மாமிச உறுப்புகளான ஈரல்,மூளை, இதயம் . . கடல் நண்டு.

உணவிலிருந்து பெறக்கூடிய கரையாத கொழுப்பு கொலஸ்டிரால் அளவை அதிகரிக்க செய்கிறது. எனவே கரையாத கொழுப்பு உட்கொள்வதைக் குறைப்பது புத்திசாலித்தனம்.

ஓரின பூரித கொழுப்பு (Mono Satured fat)

ஆலிவ் எண்ணெய், கடுகு எண்ணெய், கடலை எண்ணெய் மற்றும் நல்லெண்ணெய் ஓரின பூரித கொழுப்பாகும். இவை உடலில் உள்ள கொலஸ்டிரல் அளவில் மாற்றத்தை உண்டுபண்ணாது.

பல்இன பூரித கொழுப்பு (Poly Saturated fats)

காய்கரி எண்ணெயான சூரியகாந்தி எண்ணெய் பல்கின பூரித கொழுப்பினைச் சார்ந்தது. இது உடலில் உள்ள கொலஸ்டிரால் அளவைக் குறைப்பதால் உடலுக்கு நல்லது.

எடுத்துக் கொள்ள வேண்டிய உணவுகள்	**தவிர்க்க வேண்டிய உணவுகள்**
ஆடை நீக்கிய பால்	ஐஸ்கிரீம்
டீ	முட்டை மஞ்சக் கரு
முட்டையின் வெள்ளைக்கரு	வருத்த காய்கறிகள்
வேகவைத்த உருளைக்கிழங்கு	தேங்காய் எண்ணெய்
வேகவைத்த காய்கறிகள்	சிப்ஸ்

காய்கறி சூப்	வெண்ணெய்
சூரியகாந்தி எண்ணெய்	சிப்ஸ்
நல்லெண்ணெய்	ஆட்டுக்கறி
மீன், கோழி (தோல் உரித்தது)	
பாலாடை நீக்கிய பால்	பாலாடையுடன் கூடிய பால்
தேநீர்	ஐஸ்கீரிம்
சோளப்பொறி	சிப்ஸ்

9/ clYwt[

clYwt[gurrid fs; ,Uja mWitr; rfr;irf;Fg; gwF tHf;fkhd ,Uf;Fk/ Mz; bgz; ,UtUf;Fk; ,e;jg; gurrid ,Uf;Fk/ khj;jpiuad; gf;f tpist[fs; kd mGj;jk; Mfad fhuz ';fshFk/ c';fSila ielnul; khj;jpiufs; clYwtdnghJ cjtpahf ,Uf;Fk/ fhg. Okw;Wk; mjpfkhf rhggLtij jtph;f;f ntz;Lk; bttntwhd epiyfs; clYwtdnghJ gadhf ,Uf;Fk/

10/ ntiyf;F jpUkg[jy;

- fhh; kw;Wk; ,Urf;fu thfd';fis 12 thuj;jpw;F gpd;dh; Xl;Ljy;Kiwah Fk/
- g[iftzp. Mfha tpkhdj;jpy;10 ehl;fSf;F gpdg[wk;gazk; braayhk/
- 6?8 thuj;jpy;gi Hantiyf;F j;jpUkgyhk/
- Rhjhuzf;Fspay;eyJ

- irf;fpis;6?8 thuj;jpy;Xl;lyhk/ ,J ,Ujaj;jpw;F eyyJ
- fLikahd ntiyfis 12 thuj;jpw;F mggpwk; bra;tJ eyyJ/
- jpdKk; rpWrpW ntiyfis c';fSf;F kfpH;r;rp jUkhW bra;tJ eyyJ/

11/ bjhlh;rpfpr;ir

mLj;J c';fsJ rpfpr;irf;F tUk; njjpia epidtpy; bfhs;s ntz;Lk/ jpUkg ,/rp/$p vLggJ ,Ujaj;jpd; braiy mwpa cjtpk/ rpy ,uj;jg;ghpnrhjidfs;bfhGggpd;msit mwpa cjtpk/ bjhlh;rpfpr;ir be"RtypL ,Uja milgpg[kwpWk; ,Uja braypHg;igj; jLf;f cjtpk/ 1 khjj;jpw;F gpd; c';fSila tHf;fkhd ntiyiaj;bjhl';fyhk/

12/ khj;jpiufs;

khj;jpiufis kUj;Jthpd; Mnyhrid gpwF bjhlhpe;J filgpof;ftpk/ gpd;tUk; gf;f tpistpfs; mjpfkhf ,Ue;jhy; the;jpL m$Pzk; jiyRwpwy; kaf;fk; njhy;RHw;rpL uj;jf;frpt[clnd lhf;liu mQqftpk/ bkd;ikahd gpuic cgnahfpf;ftpk/ btspapy; brUg;ig mzpe;J bry;Yjy; eyyJ/ epiwa kd mGj;jj;ij Fiwf;ftpk/ ielnul; khj;jpiufs; be"R typapdnghJ cjtpahf ,Uf;Fk/

13/ ,Uja Xl;lj;ij kjpgpLjy;

,Uja Xl;lj;ij rPhf itggjw;fhf ePh;fs; jpdKk; gapw;rpid Koj;jgpwF vz;zyhk/ ,ij vz;Qqtjw;F

fl;ilt[uy[d; fPH[y; kz[f;flpy; ,ij czuyhk/ ,ij 6 t[dhof;F vz;z[t[l;L mjDld; g{$;$[aj;ij nrh;j;jhy; 1 e[k[ljw;fhd ,jaXl;ljij mw[ayhk/

14/ r[fbul;il e[Wj;Jjy;

r[fbul;g[ogg jhy;uj;j Xl;lkhdJ ,jaj;jw;F jilggLk/ bfh";rk; g[ifg[oj;jhYk; ,y;yht[l;lhy; vg[bghGjhtJ mh[jhf vLj;jhyK;g[ifg[oj;jy; ,Ujauj;j Xl;ljij jilggLj;Jk/ kww;wth[lk[Ue;J tUk; g[if Tl bfLjiy t[istf;Fk/ ,jDld; jP;F t[istf;Fk; urhadg[bghUs; fye;Js;sJ/ g[ifgg[oj;jiy mwnt fhgghww;w tH[tFf;Fk/ Mfnt r[fbul; g[of;fhky;,UggJ ey;y tH[KiwahFk/

15/ Rfhrdk;

gad;fs;

- ,J xU vs[a tifahd Mrdk/ e[iwa neuk;xUth;,e;j Mrdj;j[y;cl;fhuyhk/
- ,J K:r;ir cs;s[Gj;jy; kw;Wk; bts[naw;WjYf;F cWJizahf ,Uf;Fk/
- ,ij bjhlhe;J bra;jhy;kd mikj[f[ilf;Fk;

bra;Kiw

- ed;whf cl;fhutk;
- fhy;fised;F klf;ftk;

- xU fhiy Klpf;F moa;Yk; mLj;j fhiy mLj;j Klpf;F moa;Yk; itf;ftk/
- fGj;J kw;Wk; KJF neuhftk; r;d; Kj;j;iua;y; ifia itj;Jfbfhs;stk/ fz;fis ed;whf Kofbfhs;stk;
- K:r;ired;F cs;s;Gj;J rhjhuzkhf bts;t;ltk;

clwga;w;r;

,J $hd;bul;f;s;g;kUj;Jtkida;y; ,Ue;J vLf;fggl;lJ/ ,J muR uh$h$; kUj;Jtkida;y; e;fGk/ ,Uja mWitr;f;r;ir Koe;J 5?7 tJ ehs;y; ,e;j ga;w;r;ia fwg;j;J j;Ukg nehahs;ak; ,e;j ga;w;r;ia braa;ntz;Lk/ mjw;Fgg;d; clwga;w;r; Fw;gpngL xtbthU nehahs;f;Fk; jd;ahf tH';fggLk/

clwga;w;r;

,J xU tiahd ga;w;r;/ ,J Kiwahf bjhFf;fggl;L xtbthU tUf;Fk; jd;ahf tH';fggLk/

clwga;w;r;a;d;tif

Kf;f;akhf ,J bgh;a jirfisak; cgnahfggLj;j cjtk/ v/fh/ elj;jy; XLjy; Goa;y;elj;jy/

braa;ak;vz;z;f;if

3?5 jlit – thuk;

elj;jy; 5?10 e;k;lk;20 e;k;lk;bgh;a jirfis gadgLj;jy/ j;Ukg 5?10 e;k;lk;elj;jy;

bra;Kiwmst[

vy,yh neuKk; gLj;jy; kw;Wk; cl;fhUjy; E}iwa bjhe;jut[fisj;jUk/ , ij Kf;f}akhf tPpw;F brdw}j}y}Ue;J gz;zyhk/

clwga}w;r} Fw}gn;gL

bgah; **taJ:**

	elj;jy;	**clwga}w;r} th}e;J eP;Lr; bra;jy;**	**elj;jy;**
thuk;1	5 e}k}lk;	5 e}k}lk;	5 e}k}lk;
thuk;2	5 e}k}lk;	7 e}k}lk;	5 e}k}lk;
thuk;3	5 e}k}lk;	9 e}k}lk;	5 e}k}lk;
thuk;4	5 e}k}lk;	11 e}k}lk;	5 e}k}lk;
thuk;5	5 e}k}lk;	13 e}k}lk;	5 e}k}lk;
thuk;6	5 e}k}lk;	15 e}k}lk;	5 e}k}lk;
thuk;7	5 e}k}lk;	18 e}k}lk;	5 e}k}lk;
thuk;8	5 e}k}lk;	20 e}k}lk;	5 e}k}lk;
thuk;9	5 e}k}lk;	23 e}k}lk;	5 e}k}lk;
thuk;10	5 e}k}lk;	26 e}k}lk;	5 e}k}lk;
thuk;11	5 e}k}lk;	28 e}k}lk;	5 e}k}lk;
thuk;12	5 e}k}lk;	30 e}k}lk;	5 e}k}lk;

- ❖ c';fS ila ,jaj;Jog;ig clwgaw;rpapd; nghJ fzf;fpltk;
- ❖ bfh";rk; bfh";rkhf gz;Qqk; msitak; neuj;ijak; mjpfhpf;ftk;
- ❖ K:rRg;gaw;rpia 3 khj';fSf;F bjhlhe;J gz;ztk;
- ❖ Kjypy; bkJ thf bjhl';fak; gpd;dh; vy;yhtpj jirfSf;Fk; ntiy bfhLf;FkhW tphpj;J eP;Lk; clwgaw;rpiaak; filrpapy; jpUkgtk; elf;f bjhl';f ntz;Lk/
- ❖ xU thuj;jpw;F 5 Kiwaht J gz;ztk;
- ❖ bjhlhe;J vy;yh khjKk;ghpnrhj idf;F tutk; elj;jy; Kiwahd ntiy. bfh";rk; bfh";rkhf elj;jypd; msit mjpfhpf;ftk/ elf;f. elf;f c';fspd; RWRWgg[j;jd;ik mjpfkhFk/ 1?2 iky;fy; Kjypy; 3?5 iky;fs; 6 thuj;jpw;F mgg[wKk;elf;fyhk/

- njhsgl;ilia nkYk; fP3k; 6 jlit bkJ thf efh;j;j ntz;Lk/
- njhs;gl;ilia tl;l totkhf Kd;Dk; gpd;Dk; MW jilt efh;j;j ntz;Lk/
- jiyia Fdpjy; ty kw;Wk; ,lgg[w njhsgl;ilia MW jilt cah;j;Jjy/
- jiyia jpUggp njhygl;ilia 6 jlit ghh;j;jy;
- nkygg[w clk;ig ,lgg[wk; kw;Wk; tyJ gg[wk; jpUggtk/ MW jilt jpUggtk/
- ed;F cl;fhhe;J. fhy;fis bjh';f tpl;L fhypy; ,lJ kw;Wk; tyJ gg[wj;jpy;efh;j;jp MWKiw tphpj;J eP;ltk/

- bjhilianky;cah;j;j;6 Kiwgz;z tk;/
- tuy;fis Kd;Dk;gd;Dk;efh;j;j;6 Kiwbraa;tk;/

ஆற்றல் தரும் பயிற்சிகள்

1) இதயத்துடிப்பை / இயக்கத்தை அதிகரிக்கும் பயிற்சிகள்

நடைப்பயணம் இருந்த இடத்தில் நின்றவாறு மாறி மாறி கைகளை முன்னோக்கி வீசுதல் (Marching on the spot) மெதுவான சைக்கிள் சவாரி (Low level cycling) இதயத் துடிப்பை அதிகரிப்பதற்கு ஏற்ற வழியாகும். மிகவும் மென்மையாக இவைகளில் ஒன்றை மெதுவாகவும், மென்மையாகவும் செய்யுங்கள். படிப்படியாக இப்பயிற்சியின் தீவிரத்தைக் கூடுதலாக்குங்கள். இதன் நோக்கம் தசைகளை நீட்டிவிடும். பயிற்சிக்காக தசைகளை தயார்படுத்துவதாகும். அதன் வாயிலாக இதயத்துடிப்பை படிப்படியாக கூடுதலாக்குவதாகும்.

2) விரித்து நீட்டும் பயிற்சிகள் (Stretching activities)

ஆற்றல் பயிற்சியின் இரண்டாவது நிலை தசைகளை விரித்து நீட்டுவதாகும். இதனை 5 நிமிடங்களுக்கு செய்ய வேண்டும். இயன்ற அளவு தசைகளை விரித்து நீட்டுதல் வேண்டும். உடல் தசைகளை நீட்டி விடும் பொழுது கால்களையும் சேர்த்து நகர்த்துதல் வேண்டும். இது உடலை அளவான சூட்டில் வைத்திருக்க உதவும். இதயத்துடிப்பும் மெதுவாக அதிகரிக்கத் தொடங்கும்.

மேல்முதுகு தசைகளை விரித்து நீட்டுதல் (Upper back stretch)

இரண்டு கைவிரல்களைக் கோர்த்துக் கொண்டவாறு கைகளை இயன்றவரை முன்னோக்கி நீட்டுங்கள். தரையைப் பார்த்தவாறு தலையை முன்னோக்கி தொங்கவிடுங்கள். இந்நிலையில் 10-15 நொடியில் இருங்கள்

மார்பு தசைகளை விரித்து நீட்டுதல் (Chest Stretch)

இரண்டு கைகளையும் அடி முதுகில் வைத்துக் கொள்ளுங்கள். மெதுவாக கைகளை இரண்டு கைமுட்டிகளும் நேருக்கு நேர் இருக்குமாறு நகர்த்துங்கள். இந்நிலையில் 10-15 நொடிகள் இருங்கள்.

அடிமுதுகு மற்றும் இடுப்பு தசைகளை நகர்த்துதல் (Lower back and waist mobility)

தோள்பட்டை அளவுக்கு கால்களை விரித்து நில்லுங்கள். இரண்டு கைகளையும் உடலை ஒட்டியவாறு தொங்கவிடுங்கள் அல்லது இடுப்பில் வைத்துக்கொள்ளுங்கள். இடுப்பை நகர்த்தாமல் உடலைமட்டும் இடதுபக்கமாக இயன்ற அளவு வளைத்துக் கொடுங்கள். இயல்பு நிலைக்கு வாருங்கள். இங்ஙனம் உடலை வலது பக்கமாக வளைத்துக் கொடுங்கள். இந்நிலையில் பத்து நொடியில் இருங்கள். மெதுவாக இயல்பு நிலைக்கு வாருங்கள். இப்பயிற்சியினை 5 தடவைகள் செய்யுங்கள்.

முன்கால் தசைகளை விரித்து நீட்டுதல் (Calf Stretch)

குதிங்காலை தரையில் அழுத்தி ஊன்றி நீட்டி நிமிர்ந்து நில்லுங்கள். அடி காலின் பின் பகுதியில் (முன்னங்கால் பின்குதியில்) மெதுவான அழுத்த உணர்வினை அனுபவம் செய்வீர்கள். முன்னங்காலின் பின்பகுதியில் தசை அழுத்தத்தை உணரவில்லையெனில் கால்களை பின்னுக்கும் இடுப்பை முன்னுக்கும் நகர்த்தி அனுபவம் பெறுங்கள். இந்நிலையில் 10-15 நொடிகள் இருக்க வேண்டும்.

முன்னங்கால் தசைகளை விரித்து நீட்டல்

வலது காலை இடது காலுக்கு முன் 2 அடி தள்ளி வைக்கவும். சற்று முன்னோக்கி குனியவும். இரண்டு கைகளையும் இடுப்பின் மீது வையுங்கள். வலது காலை விரித்து நீட்டுங்கள். பின்னே உள்ள இடது காலை சற்று வளைத்துக் கொள்ளுங்கள். தலையை உயர்த்தி நிமிர்த்துங்கள். அடுத்து வலது முன்னங்கால் தசைகளை விரித்து நீட்டுவதால் இருக்கக்கூடிய அழுத்த உணர்வு தெரியும் வரை தலையை முன்னோக்கிக் கொண்டு செல்லுங்கள். இந்நிலையில் 10-15 நொடியில் இருக்கவும். இதே பயிற்சியினை இடது கால் முன்னமாகவும் வலது கால் பின்னமாகவும் வைத்து பண்ணுங்கள்.

முன்தொடை தசைகளை விரித்து நீட்டல் (Front of the thigh & stretch)

இடது கையை ஆதரவுக்கென சுவரின் மீது வைத்துக் கொள்ளுங்கள். வலது காலை முன்னோக்கி உயர்த்தி, வலது கணுக்காலை பின்னோக்கி பிடிக்கவும். இடதுகாலை சற்று வளைக்கவும். இடது வலது கால் முட்டிகளை சேர்த்து வலது காலை பின்னோக்கி உயர்த்தியவாறு நகர்த்துங்கள். முதுகு நேராக இருக்கட்டும். இடுப்பை முன்னோக்கி நகர்த்துங்கள். வலது முன்தொடை தசைகளில்

அழுத்தத்தை உணரும் வரை, இந்நிலையில் 10-15 நொடிகள் இருங்கள். வலது கையை ஆதரவாக சுவரில் வைத்து இடது காலுக்கு இப்பயிற்சி கொடுங்கள்.

இதயத்துடிப்பு அதிகப்படுத்தும் பயிற்சி

ஆற்றல் தரும் பயிற்சிகளைத் தொடக்கத்தில் செய்தது போன்று தசைகளை விரித்து நீட்டும் பயிற்சி செய்து முடித்த பின்னர் 5 நிமிடங்கள் செய்யவேண்டும். முன்னர் கூறியபடி நடைப்பயணம், இருந்த இடத்தில் நின்றவாறு இரு கைகளையும் மாறி மாறி வீசுவது, மெதுவான சைக்கிள் சவாரி இதயத்துடிப்பை அதிகப்படுத்தும் வழிகளாகும்.

தளர்வுபடுத்துதல் (Cool down)

அமர்வு முடிவில் முறையாக தளர்வுபடுத்துவதற்குப் போதிய காலம் விடுவது அவசியம். தளர்வின் போது உடல் இயக்கம் மெதுவாக குறையும். தளர்வுபடுத்துவதின் நோக்கம் உடலை ஓய்வுநிலைக்குக் கொண்டு வருவதாகும்.

பத்து நிமிடங்கள் உடலை தளர்வு படுத்துங்கள். பயிற்சியை சட்டென்று நிறுத்தினால் இரத்த அழுத்தம் குறைந்து தலைச்சுற்று அல்லது மயக்கம் ஏற்படலாம். உடலை தளர்த்தினால் இத்தகைய அபாயங்களைத் தவிர்க்கலாம்.

சட்டென்று பயிற்சியை நிறுத்தினால் இதயத்தின் இயைபில் ஏற்படக்கூடிய மாற்றங்களையும் தளர்வு பயிற்சியினால் தவிர்க்கலாம்.

APPENDIX X A

மாதிரி உணவுத்தாள்

காலை 6.30 மணி	டீ (அ) காபி (அ) பால்	1 கப்
காலை 8.30 மணி	இட்லி (அ) தோசை (அ) சப்பாத்தி (அ) உப்புமா (அ) பொங்கல் (நெய், டால்டா இல்லாமல்) சட்னி (தக்காளி, புதினா, மல்லி) சாம்பார் (காய்கறி) அல்லது ரொட்டி (அ) டோஸ்ட் / ஜாம்	3/2/3 1 1/2 கப் 4-5 tsp 1 கப் 3 slices
முற்பகல் 10.30 மணி	முட்டை (வெள்ளைக்கரு) நீர்மோர் (அ) தக்காளி சூப் (அ) காய்கறி சூப்	மட்டும் 1 கப்
மதியம் 12.30 மணி	காய்கறி சூப்	1 கப்
	சப்பாத்தி (அ) சாதம்	1 கப்
	சாம்பார் (அ) பருப்புசாதம்	3 1/2 கப்
	காய்கறி கூட்டு	1 கப்
	காய்கறி பொறியல் (கீரை வகைகள்)	2 கப்
	பச்சை காய்கறிகள் (சாலட்)	2-3 கப்
	தயிர் (அ) மோர்	1 கப்
	பழம் (குறிப்பிட்டவை மட்டும்)	4-5 துண்டுகள் (100 கிராம்)
மாலை 4.00 மணி	டீ (அ) காபி (அ) பால் (சர்க்கரை இல்லாமல்)	
	பிஸ்கட்டுகள் (மாரி)	1 கப்
	முளைகட்டிய தானியம் சுண்டல்	3 Nos
இரவு 8.00மணி	மதிய உணவு (அ) காலை உணவுபோல	1/2 கப்
இரவு 9.30 மணி	பால் 1 கப் (சர்க்கரை இல்லாமல்)	
	1 கப் - 150 மிலி	

APPENDIX X B

clwgaw;rp Fwpgng L

bgah; taJ:

	elj;jy;	clwgaw;rp tpne;J ePL r; bra;jy;	elj;jy;
thuk;1	5 epkplk;	5 epkplk;	5 epkplk;
thuk;2	5 epkplk;	7 epkplk;	5 epkplk;
thuk;3	5 epkplk;	9 epkplk;	5 epkplk;
thuk;4	5 epkplk;	11 epkplk;	5 epkplk;
thuk;5	5 epkplk;	13 epkplk;	5 epkplk;
thuk;6	5 epkplk;	15 epkplk;	5 epkplk;
thuk;7	5 epkplk;	18 epkplk;	5 epkplk;
thuk;8	5 epkplk;	20 epkplk;	5 epkplk;
thuk;9	5 epkplk;	23 epkplk;	5 epkplk;
thuk;10	5 epkplk;	26 epkplk;	5 epkplk;
thuk;11	5 epkplk;	28 epkplk;	5 epkplk;
thuk;12	5 epkplk;	30 epkplk;	5 epkplk;

- c';fS ila , jaj;Jog;ig clwgaw;rpad; nghJ fz f;fplt[k;
- bfh";rk; bfh";rkhf gz;Qqk; ms i ta[k; neuj;i ja[k; mjpfhpf;f t[k;

- K:rRg;gapw;rp ia 3 khj ';f S f;F bjhlhe;J gz;z tk;
- K jypy; bkJ thf bjhl';fpak; gpd;dh; vy;yhtpj jirfSf;Fk; nt iy bfhLf;FkhW tphpj;J ePh;Lk; clwgapw;rp iaak; f i l rpapy; jpUkgtk; elf;f bjhl';f ntz;Lk/
- xU thuj;jpw;F 5 K iwaht J gz;z tk;
- bjhlhe;J vy;yh khj Kk;ghpnrhj idf;F tutk; elj;jy; K iwahd nt iy. bfh";rk; bfh";rkhf elj;jypd; msit mjpfhpf;f tk/ elf;f. elf;f c';fspd; RWRWgg[j;jd;ik mjpfkhFk/ 1?2 iky;fy; K jypYk; 3?5 iky;fs; 6 thuj;jpw;F mgg[wKk;elf;fyhk/

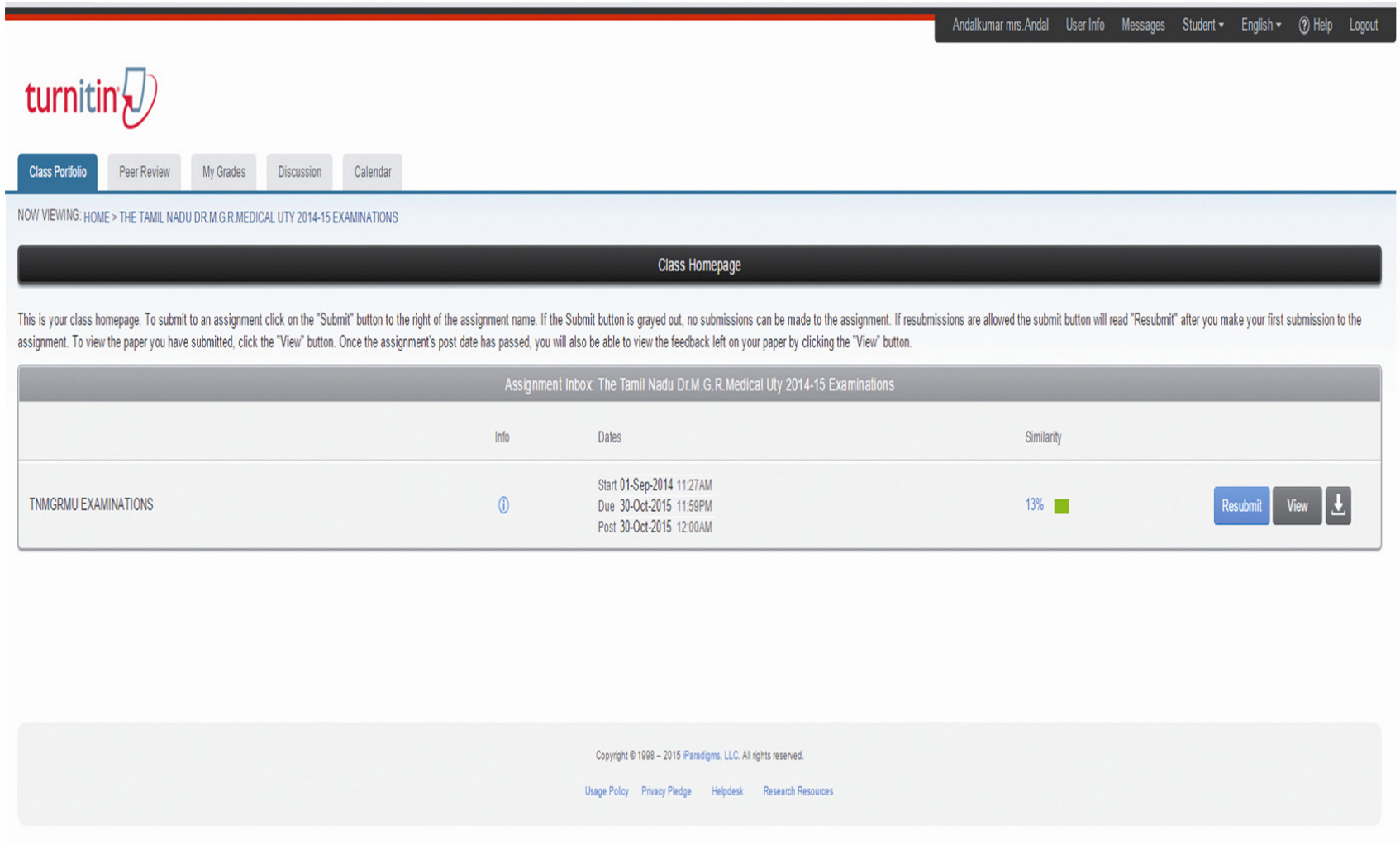
APPENDIX X C

PHOTOES

APPENDIX – XI
TIME SCALE

TIME SCALE FOR EVENTS OF RESEARCH FROM OCT 2010 TO MAY 2015													
S. No	Task	2010		2011		2012		2013		2014		2015	
		Oct – Mar	Apr – Sep	Oct – Mar	Apr – Sep	Oct – Mar	Apr – Dec	Jan – Mar	Mar – Sep	Sep – April	May – Sep	Oct - Mar	Apr – August
1	Literature review												
2	Research proposal and provisional registration												
3	Seminar attended and presentation												
4	Methodology Exam												
5	Research tool(s) selection and draft preparation												
6	Validity and reliability of tools												
7	Pilot study permission and conduction												
8	Main study permission and conduction												
9	Draft all writing for chapters												
10	Coding, data for analysis and compiling results.												
11	Preparation and submission of synopsis												
12	Final draft preparation and thesis submission												

APPENDIX XII



இதய நோயைத் தவிர்க்க பத்து வழிகள்

- ஆரோக்கியமான உடல் எடை எய்தி அதனை பாதுகாத்துக் கொள்ளுங்கள்
- உப்பு &சோடியம் எடுத்துக் கொள்ளும் அளவைக் குறைத்துவிடுங்கள்
- உடல் உழைப்பை அதிகப்படுத்துங்கள்
- புகை மற்றும் புகையிலைப் பொருட்களின் பயன்பாட்டைத்தவிர்த்துவிடுங்கள்
- மது அருந்துதலை தவிர்த்துவிடுங்கள்
- மன அழுத்தத்தை தவிர்த்துவிடுங்கள்
- வாழ்க்கையை நேர்மறையான நோக்குடன் பாருங்கள்
- எப்பொழுதும் சந்தோசமாகஇருங்கள்
- 7-8 மணி நேர உறக்கத்தை வழக்கமாகவைத்துக்கொள்ளுங்கள்
- கொழுப்புத் திவலைகளை குறைவாக உள்ள உணவினைத் தேர்ந்தெடுத்து உண்ணுங்கள்.
- காய்கறிகளையும், பழங்களையும் உணவில் சேர்த்துக் கொள்ளுங்கள்

பரிசோதனைகள்

பரிசோதனை	இருக்கவேண்டிய அளவு
குறைந்த அடர்த்தியுள்ள கொழுப்பு (LDL)	130மிகிகீழே
அதிகஅடர்த்தியுள்ள கொழுப்பு (HDL)	60மிகி க்கு மேலே
மொத்த கொழுப்பு (Total Cholesterol)	200மிகி க்கு கீழே
ட்ரைகிளிசரைட்ஸ் (triglycerides)	200மிகி க்கு கீழே

வாழ்க்கை நடைமுறை மாற்றங்கள்

1. உணவு மாற்றங்கள் மற்றும் கடைப்பிடிக்கவேண்டியவை
2. சர்க்கரை நோயினை கையாளுதல்
3. புகைத்தலை நிறுத்தல்
4. உடல் வேலை
5. பால்வினைசெயல்

வாழ்க்கை நடைமுறை மாற்றங்கள்

உணவு மாற்றங்கள் மற்றும் கடைப்பிடிக்கவேண்டிய மாற்றங்கள்

- கொலஸ்ட்ராலும் கொழுப்பும் இதய நோய்க்கும் ஆபத்தானவை.
- **மூன்று விதமான கொழுப்புகள் உள்ளது**

கரையாத கொழுப்பு (saturated)	ஒரின கொழுப்பு (Mono Saturated)	பல் இன பூரித கொழுப்பு (Poly Saturated)
•பால் மற்றும் பால் பொருட்கள் •பேக்கரி பொருட்கள் (கேக், பப்ஸ்) •டால்டா, வனஸ்பதி •தேங்காய் •தேங்காய் எண்ணெய், பனை எண்ணெய் •மாமிச கொழுப்பு, முட்டை மஞ்சள் கரு, மாமிசஉறுப்புகளான ஈரல்,மூளை, இதயம் கடல் நண்டு.	• ஆலிவ் எண்ணெய், • கடுகு எண்ணெய், • கடலை எண்ணெய் மற்றும் • நல்லெண்ணெய்.	• சூரியகாந்தி எண்ணெய் • காய்கறியிலிருந்து கிடைக்கும் எண்ணெய் வகைகள்
குறைப்பது புத்திசாலித்தனம்	**மாற்றத்தை உண்டுபண்ணாது**	**உடலுக்கு நல்லது**

எடுத்துக் கொள்ள வேண்டிய உணவுகள்	தவிர்க்க வேண்டிய உணவுகள்
ஆடை நீக்கிய பால்	ஐஸ்கிரீம்
டீ	முட்டை மஞ்சக்கரு
முட்டையின் வெள்ளைக்கரு	வருத்தகாய்கறிகள்
வேகவைத்தஉருளைக்கிழங்கு	தேங்காய்எண்ணெய்
காய்கறி சூப்	வெண்ணெய்
நல்லெண்ணெய்	சிப்ஸ்
மீன், கோழி (தோல் உரித்தது)	ஆட்டுக்கறி
கீரின் டீ	பாலாடையுடன் கூடிய பால்

2. சர்க்கரை நோயை கையாளுதல்

- உடல் பயிற்சி இரத்தத்தில் சர்க்கரையின் அளவு குறையஉதவும்.
- வாய்வழியாக மருந்துகள் எடுத்துக் கொள்வது அல்லது இன்சுலின் சிகிட்சை தொடர்ந்து கடைப்பிடிக்கவும்
- சர்க்கரை நோய்க்கான காரணிகளைக் கட்டுப்படுத்தல் வேண்டும்,
- உடல் எடையைக் குறைக்க வேண்டும்
- உணவுமுறையில் மாற்றத்தை கையாள வேண்டும்.
- இரத்தத்தில் சர்க்கரையின் அளவைக் கட்டுப்பாட்டில் வைத்திருப்பது அவசியம். உடல் உழைப்பு, உடல் எடை,இரத்தஅழுத்தம், கொலஸ்ட்ரால் அளவு போன்றஇவைகளை கட்டுப்பாட்டில் வைத்திருக்க தீவிரமான மாற்றங்களை மேற்கொள்ள வேண்டும்.

3. புகைத்தலை நிறுத்துதல்

- இதய தமனிநாள நோயாளிகளின் இரத்தஓட்டத்தடையையும் நெஞ்சுவலியையும் புகைபிடித்தல் அதிகமாக்கும்.
- இவர்கள் புகைப்பிடிப்பதை நிறுத்தவேண்டும்.
- புகைப்பவர் பக்கத்தில் இருப்பதைக் குறைக்க முயற்சி மேற்கொள்ள வேண்டும்.
- புகைப்பிடித்தலை நிறுத்தத்தவறிவிட்டால், மறு உத்தரவாதம் கூறி புகைப் பிடித்தலை நிறுத்துவதற்கான முயற்சியை மேற்கொள்ள ஊக்கப்படுத்தவேண்டும்.
- புகைபிடித்தலை தடுக்கும் உத்தி வாழ்நாளை நீட்டும்.

4. உடல் வேலை

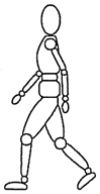
- உடல் எடையே கட்டுப்பாட்டில் வைத்திருக்கவேண்டும்.
- ஒவ்வொருநாளும் 20-30 நிமிடங்களுக்கு மிதமான உடல் வேலைகள் செய்து உடல் உழைப்பை அதிகப்படுத்தவேண்டும்.
- வேலை செய்வதற்கு முன்னரும் வேலை செய்து முடித்த பின்னரும் ஐந்து நிமிடங்களுக்கு இலேசாகஉடல் உறுப்புக்களை நீட்டி இழுத்துவிடுவது அவசியம்.
- திடீரென்று உடல் வேலையை தொடங்கவோ நிறுத்தவோகூடாது. வேலைத்தன்மையை நோயாளரின் இதயத்தின் செயல்பாட்டிற்கேற்ப முடிவு செய்யவேண்டும்.
- உளவியல் மற்றும் சமூகவியல் ரீதியாகமுன்னேற்றங் காணல், இறுக்கம் குறைத்தல், தன்னிச்சையாக செயல்படுவது, இயலாமையை தவிர்ப்பது, தன்னிச்சையாகதன்னை பராமரிப்பதற்கான வாய்ப்புக்களை அதிகப்படுத்துவதுபோன்ற இலட்சிய குறிக்கோள்களை இவர்கள் அடைய வேண்டும்.

5. பால்வினை செயல்

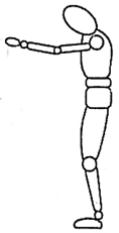
- இதய நோயாளர்கள் பொதுவாக சந்திக்கக் கூடிய பால்வினை பிரச்சினைகள், ஆண்மைக்குறைவு (Impotence) முதிர்வுபெறாத அல்லது தாமதமான விந்தேற்றம் (Premature or delayed ejaculation)ர ஆண்-பெண் இருபாலரிடம் பாலுணர்வு (libido) குறைவுபடல் போன்றவை ஆகும். தொடர் மருத்துவ சிகிட்சையாலோ, மனத்தளர்ச்சியாலோ, இதயத்தின் செயல் படிமானத்தினால் நோயாளருக்கு இப்பிரச்சனைகள் ஏற்படலாம்.
- வெவ்வேறு நிலைகள் பயனுள்ளதாக இருக்கும்.
- மன அழுத்தமில்லாதஉற்சாகஉணர்வுஇதற்கு அவசியம்

உடற் பயிற்சிமுறைகள்

1) இதயத்துடிப்பை / இயக்கத்தை அதிகரிக்கும் பயிற்சிகள்

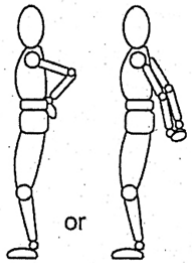


2) விரித்து நீட்டும் பயிற்சிகள் (Stretching activities)

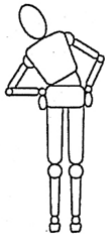


3)மேல்முதுகு தசைகளை விரித்து நீட்டுதல் (Upper back stretch)

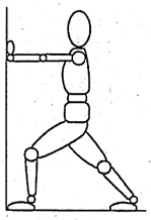
மார்பு தசைகளை விரித்து நீட்டுதல் (Chest Stretch)



4)அடிமுதுகு மற்றும் இடுப்பு தசைகளை நகர்த்துதல் (Lower back and waist mobility)

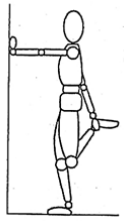


5)முன்கால் தசைகளை விரித்து நீட்டுதல் (Calf Stretch)

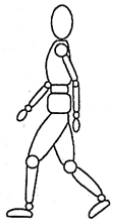


6)முன்னங்கால் தசைகளை விரித்து நீட்டல்

7)முன்தொடை தசைகளை விரித்து நீட்டல்
(Front of the thigh & stretch)



8)தளர்வுபடுத்துதல்
(Cool down)



இதயநல மறுவாழ்வு

நலக் குறிப்புகள்